2008 TRANSMISSION

Transfer Case - MP 3023/3024-NQH - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

SPECIFICATIONS

APPROXIMATE FLUID CAPACITIES

Application	Specification	
	Metric	English
DEXRON®VI GM P/N 88861003 (Canadian P/N 88861004)	1.5 liters	1.6 quarts

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Transfer Case Actuator Shaft Position Sensor Bolt/Screw	9 N.m	80 lb in
Transfer Case Bolts (Qty: 17)	25 N.m	18 lb ft
Transfer Case Oil Drain Plug	18 N.m	13 lb ft
Transfer Case Oil Fill Plug	18 N.m	13 lb ft
Transfer Case Shift Fork Shaft Guide Screw	5 N.m	44 lb in
Transfer Case 2/4 Wheel Drive Actuator Bolt/Screw	18 N.m	13 lb ft
Vehicle Speed Sensor Assembly	17 N.m	13 lb ft

SEALERS, ADHESIVES, AND LUBRICANTS

Application	Type of Material	GM Part Number	
		United States	Canada
Transfer Case	Transfer Case Fluid	88861003	88861004
Transfer Case Oil Drain Plug	Pipe Sealant	12346004	10953480
Transfer Case Oil Fill Plug	Pipe Sealant	12346004	10953480
Transfer Case Rear Case Half to Transfer Case Front Half Assembly	RTV Sealant	12345739	10953541
Transfer Case Shift Fork Shaft Guide	Threadlock	12345493	10953488

Screw			
Transfer Case Vent	Retaining Compound	12377901	10953504
Vehicle Speed Sensor - O-Ring - Seal	Transfer Case Fluid	88861003	88861004

SCHEMATIC AND ROUTING DIAGRAMS

TRANSFER CASE CONTROL SCHEMATICS

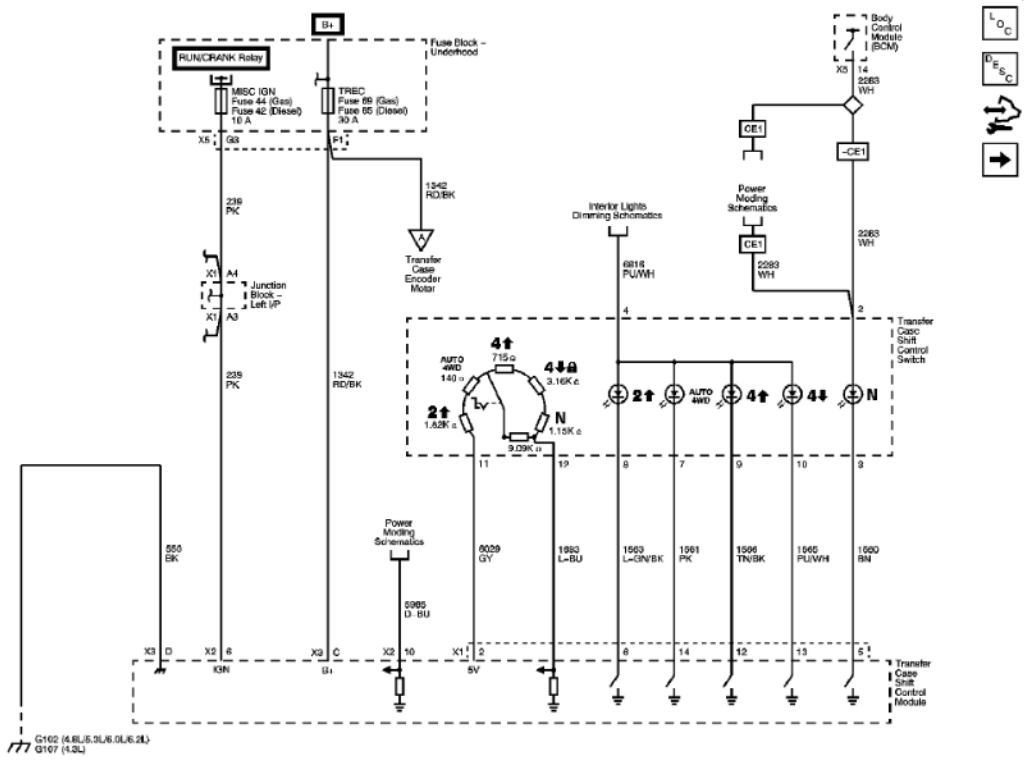


Fig. 1: Power, Ground and Shift Controls
Courtesy of GENERAL MOTORS CORP.

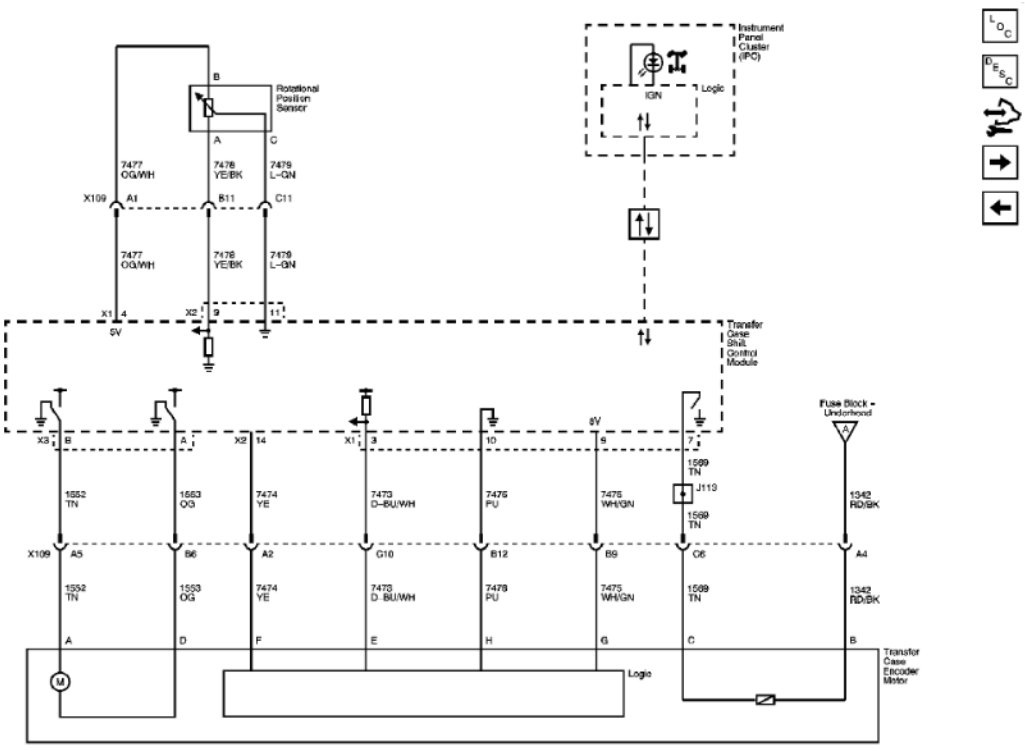


Fig. 2: Transfer Case Controls
Courtesy of GENERAL MOTORS CORP.

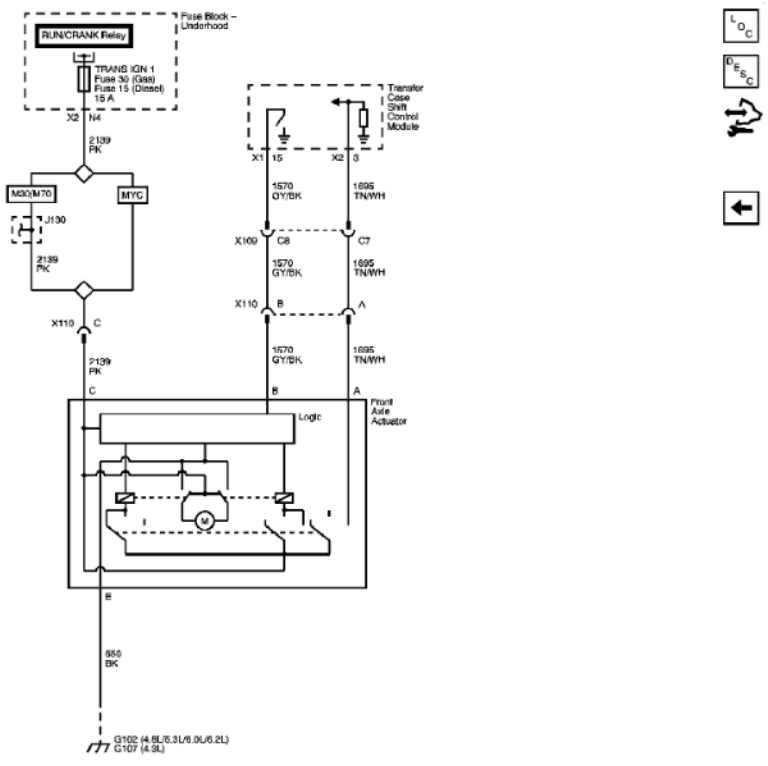


Fig. 3: Front Axle Controls
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

TRANSFER CASE DISASSEMBLED VIEW

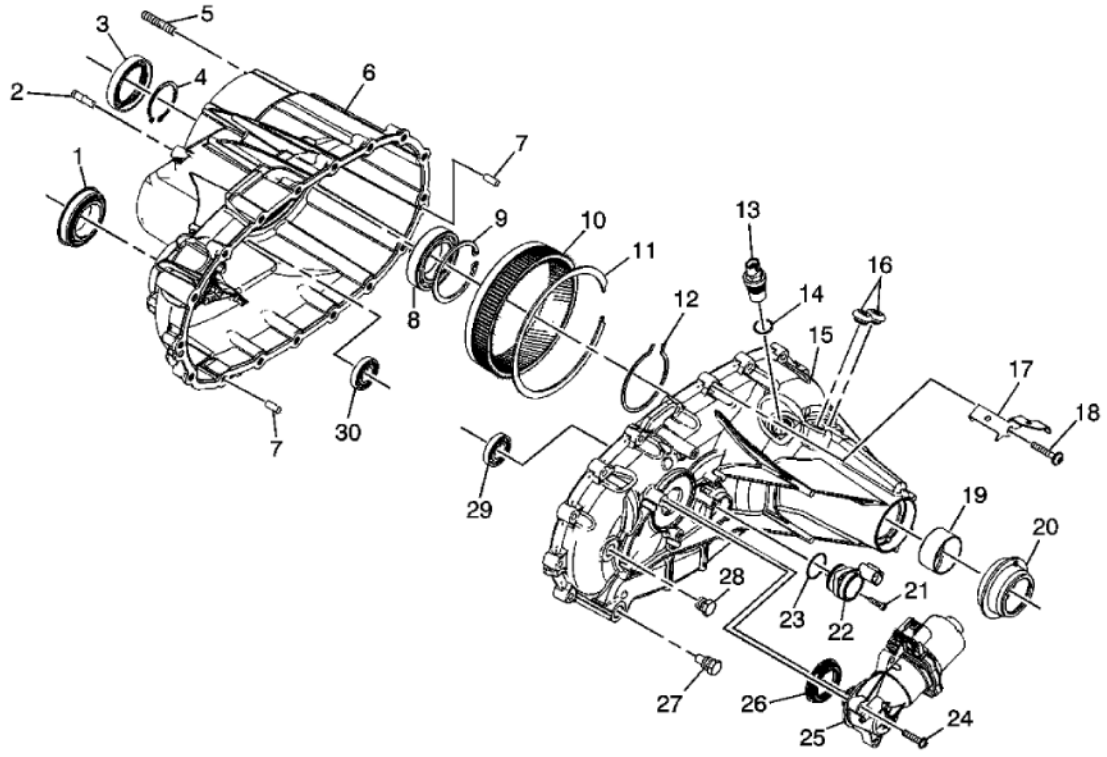


Fig. 4: Case Half Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Transfer Case Front Output Shaft Seal
2	Transfer Case Vent
3	Transfer Case Input Shaft Seal
4	Transfer Case Input Shaft Bearing Outer Retaining Ring
5	Transfer Case Stud
6	Transfer Case Front Half
7	Transfer Case Half Locating Pin
7	Transfer Case Half Locating Pin
8	Transfer Case Input Shaft Bearing Assembly
9	Transfer Case Input Shaft Inner Retaining Ring
10	Transfer Case High/Low Internal Gear
11	Transfer Case High/Low Internal Gear Retaining Ring
12	Transfer Case Rear Output Shaft Rear Bearing Outer Retaining Ring
13	Vehicle Speed Sensor Assembly

14	Vehicle Speed Sensor - O-Ring - Seal
15	Transfer Case Rear Half
16	Transfer Case Access Hole Plug
17	Transfer Case - Harness - Bracket
18	Transfer Case Half Bolt/Screw
19	Transfer Case Rear Output Shaft Bushing
20	Transfer Case Rear Output Shaft Seal
21	Transfer Case Actuator Shaft Position Sensor Bolt/Screw
22	Transfer Case Actuator Shaft Position Sensor Assembly
23	Transfer Case Actuator Shaft Position Sensor - O-Ring - Seal
24	Transfer Case Two/Four Wheel Drive Actuator Bolt/Screw
25	Transfer Case Two/Four Wheel Drive Actuator Assembly
26	Transfer Case Two/Four Wheel Drive Actuator Seal
27	Transfer Case Oil Drain Plug
28	Transfer Case Oil Fill Plug
29	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Assembly
30	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Assembly

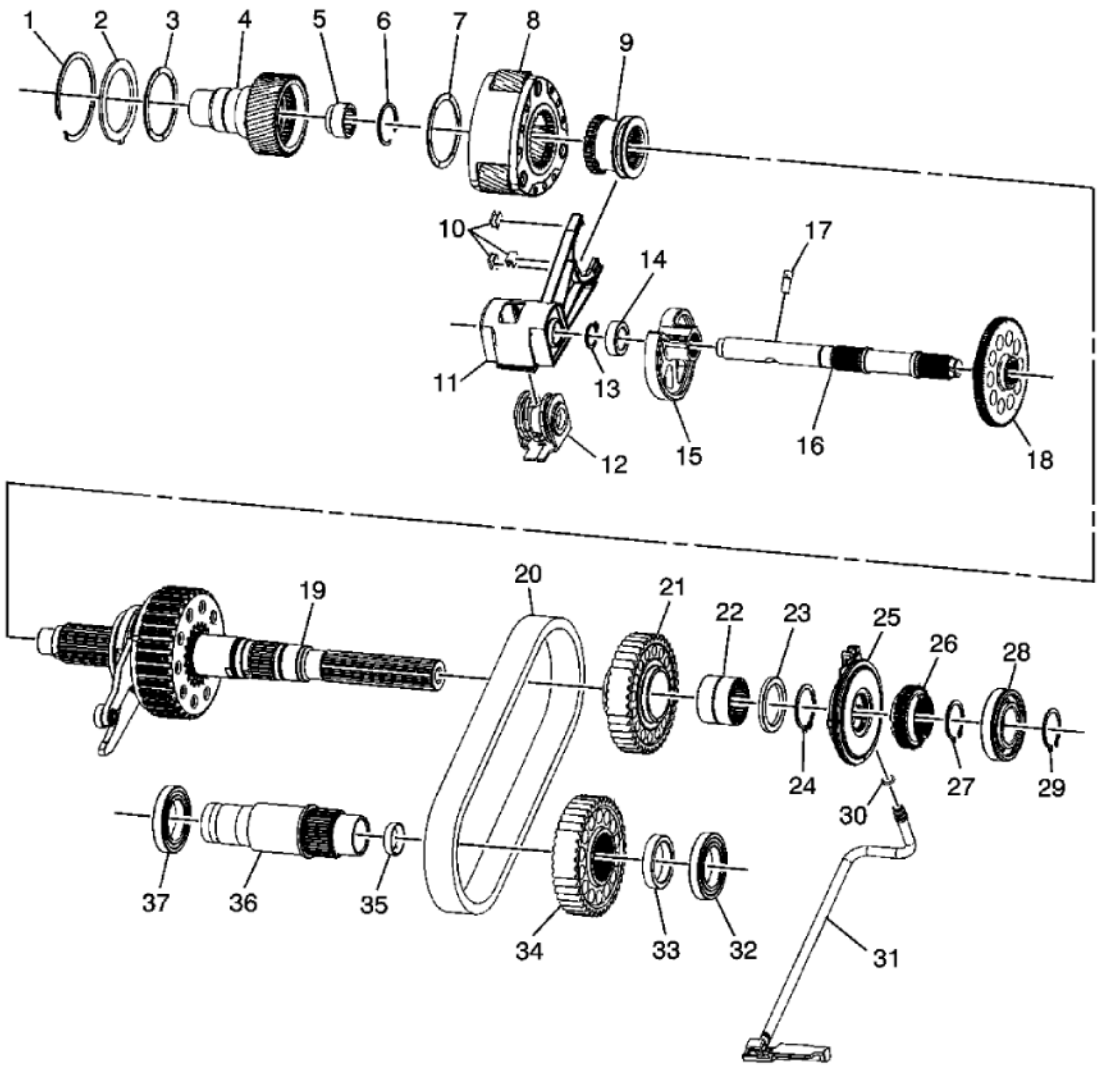


Fig. 5: Internal Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Transfer Case High/Low Planetary Carrier Retaining Ring
2	Transfer Case High/Low Locking Plate
3	Transfer Case Planetary Carrier Sun Gear Thrust Washer
4	Transfer Case Input Shaft
5	Transfer Case Input Shaft Pilot Bearing Assembly
6	Transfer Case Input Shaft Pilot Bearing Retaining Ring - HD Only
7	Transfer Case Planetary Carrier Sun Gear Thrust Washer
8	Transfer Case High/Low Planetary Carrier Assembly

9	Transfer Case High/Low Clutch
10	Transfer Case High/Low Shift Fork Pad
11	Transfer Case High/Low Shift Fork
12	Transfer Case High/Low Shift Fork Spring Assembly
13	Transfer Case Two/Four Wheel Drive Actuator Cam Retaining Ring
14	Transfer Case Two/Four Wheel Drive Actuator Cam Spacer
15	Transfer Case Two/Four Wheel Drive Actuator Cam
16	Transfer Case Control Actuator Shaft
17	Transfer Case High/Low Shift Fork Pin
18	Transfer Case Actuator Shaft Gear
19	Transfer Case Rear Output Shaft Assembly
20	Transfer Case Front Output Shaft Drive Chain Assembly
21	Transfer Case Front Output Shaft Drive Sprocket
22	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly
23	Transfer Case Front Output Shaft Drive Sprocket Spacer - Rear
24	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring
25	Transfer Case Oil Pump Assembly
26	Transfer Case Rear Output Shaft Speed Reluctor Wheel
27	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
28	Transfer Case Rear Output Shaft Rear Bearing Assembly
29	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
30	Transfer Case Oil Pump Suction Pipe Seal
31	Transfer Case Oil Pump Suction Pipe
32	Transfer Case Front Output Shaft Rear Bearing Assembly
33	Transfer Case Front Output Shaft Driven Sprocket Spacer
34	Transfer Case Front Output Shaft Driven Sprocket
35	Transfer Case Front Output Shaft Hole Plug
36	Transfer Case Front Output Shaft
37	Transfer Case Front Output Shaft Front Bearing Assembly

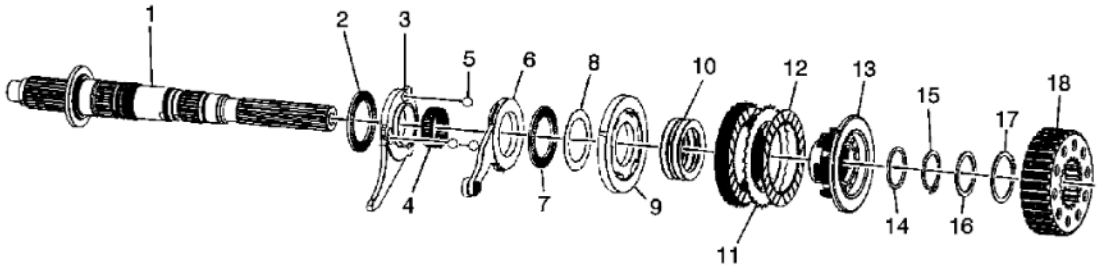


Fig. 6: Clutch Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Transfer Case Rear Output Shaft
2	Transfer Case Control Actuator Lever Thrust Bearing Assembly
3	Transfer Case Control Lever
4	Transfer Case Control Actuator Lever Bearing Assembly
5	Transfer Case Control Actuator Lever Ball (Qty: 3)
6	Transfer Case Control Actuator Lever Assembly
7	Transfer Case Control Actuator Lever Thrust Bearing Assembly
8	Transfer Case Control Actuator Lever Washer
9	Transfer Case Four Wheel Drive Clutch Pressure - Apply - Plate
10	Transfer Case Four Wheel Drive Clutch Pressure Plate Spring (Qty: 4)
11	Transfer Case Four Wheel Drive Clutch Pressure - Steel - Plate (Qty: 7)
12	Transfer Case Four Wheel Drive Clutch Pressure - Friction - Plate (Qty: 8)
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 Front Output Shaft Drive Sprocket Spacer - Front
17	Transfer Case Four Wheel Drive Clutch Housing Retaining Ring
18	Transfer Case Four Wheel Drive Clutch Housing

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B0770	B0770 01: AWD Indicator Circuit Short to Battery B0770 06: AWD Indicator Circuit Short to Ground or Open
DTC B0775	B0775 01: 4 High Indicator Circuit Short to Battery B0775 06: 4 High Indicator Circuit Short to Ground or Open
DTC B0780	B0780 01: 4 Low Indicator Circuit Short to Battery B0780 06: 4 Low Indicator Circuit Short to Ground or Open
DTC B0785	B0785 01: 2 High Indicator Circuit Short to Battery B0785 06: 2 High Indicator Circuit Short to Ground or Open
DTC B0790	B0790 01: Neutral Indicator Circuit Short to Battery B0790 06: Neutral Indicator Circuit Short to Ground or Open
DTC B2725	B2725 08: Active Transfer Case Mode Switch Circuit
DTC C0306	C0306 02: Motor A or B Circuit Short to Ground C0306 05: Motor A or B Circuit Short to Battery or Open
DTC C0321	C0321 01: Transfer Case Lock Circuit Short to Battery C0321 02: Transfer Case Lock Circuit Short to Ground C0321 04: Transfer Case Lock Circuit Open C0321 08: Transfer Case Lock Circuit Signal Invalid
DTC C0374	C0374 54: General System Performance Temperature High
DTC C0379	C0379 01: Front Axle System Short to Battery C0379 02: Front Axle System Short to Ground C0379 04: Front Axle System Open Circuit C0379 08: Front Axle System Signal Invalid
DTC C0387	C0387 59: Unable to Complete Shift Circuit/Component Protection Timeout
DTC C0392	C0392 01: Rotational Position Sensor Circuit Short to Battery C0392 02: Rotational Position Sensor Circuit Short to Ground C0392 08: Rotational Position Sensor Circuit Signal Invalid
DTC C0396	C0396 01: Incremental Position Sensor Circuit Short to Battery C0396 02: Incremental Position Sensor Circuit Short to Ground C0396 04: Incremental Position Sensor Open Circuit C0396 05: Incremental Position Sensor Circuit Short to Battery or Open
DTC C0397	C0397 64: Transfer Case Clutch Performance Actuator Slipping
DTC C0398	C0398 5A: Incremental Sensor - Rotational Position Sensor Correlation Plausibility Failure

DTC C0550	C0550 37: Electronic Control Unit Malfunction Watchdog/Safety Failure C0550 39: Electronic Control Unit Malfunction Internal Electronic Failure
DTC C0569	C0569 4B: System Configuration Error Calibration Data Not Learned
DTC C0896	C0896 03: Device Voltage Range Voltage Below Threshold C0896 07: Device Voltage Range Voltage Above Threshold
DTC P2160 or P2161	P2160: Vehicle Speed Sensor (VSS) 2 Circuit Low Voltage P2161: Vehicle Speed Sensor (VSS) 2 Circuit Intermittent

DIAGNOSTIC STARTING POINT - TRANSFER CASE

Begin the system diagnosis with the **Diagnostic System Check - Vehicle** . The Diagnostic System Check will provide the following information:

- The identification of the control module or modules that command the system.
- The ability of the control module or modules to communicate through the serial data circuit.
- The identification of any stored diagnostic trouble codes (DTCs) and the status of the codes.

The use of the **Diagnostic System Check - Vehicle** will identify the correct procedure for diagnosing the system and where the procedure is located.

SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Control	Additional Menu Selections	Description
Refer to the scan tool manual for complete scan tool operating instructions. **IMPORTANT:** **Transmission must be in transmission neutral for any of these output controls to operate.**		
2WD High Indicator Light	-	This function allows the technician to command the 2WD high indicator light, within the transfer case shift control switch, on or off.
4WD High Indicator Light	-	This function allows the technician to command the 4WD high indicator light, within the transfer case shift control switch, on or off.
4WD Low	-	This function allows the technician to command the 4WD low indicator light, within the transfer case

Indicator Light		shift control switch, on or off.
ATC Motor Learn	-	This function allows the technician to command the transfer case shift control module to relearn the clutch status after the encoder motor, module, or transfer case is replaced.
Auto 4WD Indicator Light	-	This function allows the technician to command the auto 4WD indicator light, within the transfer case shift control switch, on or off.
Neutral Indicator Light	-	This function allows the technician to command the neutral indicator light, within the transfer case shift control switch, on or off.

SCAN TOOL DATA LIST

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Engine is at idle, upper radiator hose is hot, closed throttle, gear is in Park or Neutral, and accessories are OFF.			
2WD High Indicator Light	Transfer Case Data	On/Off	On
4WD High Indicator Light	Transfer Case Data	On/Off	Off
4WD Low Indicator Light	Transfer Case Data	On/Off	Off
Accessory Status	Transfer Case Data	Not Active/Active	Active
ATC Motor Init. Test	Transfer Case Data	Not Initialized/Passed/Failed/In Progress	Passed
Auto 4WD Indicator Light	Transfer Case Data	On/Off	On
Battery Voltage	Transfer Case Data	Volts	Battery Voltage
Clutch Calibration Status	Transfer Case Data	Not Learned/Initial Learn/Normal Learn	Normal Learn
Clutch Coupling	Transfer Case Data	0-100%	Varies
	Transfer Case		

Front Axle Actuator	Data	Volts	Battery Voltage
Front Axle Actuator Status	Transfer Case Data	Engaged/Disengaged	Disengaged
Front Axle Switch	Transfer Case Data	Locked/Unlocked	Unlocked
Incremental Impulse Sensor	Transfer Case Data	PWM Voltage	Varies
Incremental Position Sensor Direction	Transfer Case Data	Clockwise/Counter Clockwise	Varies
Incremental Position Sensor	Transfer Case Data	Degrees	Varies
Incremental Position Sensor	Transfer Case Data	Volts	Varies
Mode Switch Return Voltage	Transfer Case Data	Volts	Varies
Mode Switch Selected	Transfer Case Data	Auto 4WD/2 High/4High/4 Low/Neutral	2 High
Mode Switch Supply Voltage	Transfer Case Data	Volts	5 Volts
Motor Brake	Transfer Case Data	Volts	Battery Voltage
Neutral Indicator Light	Transfer Case Data	On/Off	Off
Rotational Position Sensor	Transfer Case Data	Degrees	Varies
Rotational Position Sensor	Transfer Case Data	Volts	Varies
Run/Crank	Transfer Case Data	Active/Inactive	Active
Software Part Number	Transfer Case Data	GM Part Number	Current Software Release
Transfer Case Lock	Transfer Case Data	Engaged/Disengaged	Disengaged
Transfer Case Motor	Transfer Case Data	Amperage	0 Amps
Transfer Case Position	Transfer Case Data	Current Transfer Case Mode or Range	2 High

Trans. Fluid Temp	Transfer Case Data	Degrees C	Varies
TR Switch Status	Transfer Case Data	Current Transmission Gear	Park
Vehicle Speed	Transfer Case Data	km/h	Varies

SCAN TOOL DATA DEFINITIONS

2WD High Indicator Light

This parameter displays On when the transfer case shift control module commands the 2WD high indicator light On. The scan tool displays On or Off.

4WD High Indicator Light

This parameter displays On when the transfer case shift control module commands the 4WD high indicator light On. The scan tool displays On or Off.

4WD Low Indicator Light

This parameter displays On when the transfer case shift control module commands the 4WD low indicator light On. The scan tool displays On or Off.

Accessory Status

This parameter displays Not Active, and Active.

ATC Motor Init. Test

This parameter displays Not Initialized, Passed, Failed, or in Progress when the key off initialization sequence has occurred.

Auto 4WD Indicator Light

This parameter displays On when the transfer case shift control module commands the auto 4WD indicator light On. The scan tool displays On or Off.

Battery Voltage

This parameter displays the voltage measured by the transfer case shift control module at the

transfer case shift control module battery feed. The scan tool displays a range of 0-25.5 volts.

Clutch Calibration Status

This parameter displays not learned, initial learn, and normal learn.

Clutch Coupling

This parameter displays the amount of clutch activation shown in percentage.

Front Axle Actuator

This parameter displays the voltage input to the front axle actuator from 0 - 25 volts.

Front Axle Actuator Status

This parameter displays either disengaged or engaged, engaged when the system is in Auto 4WD, 4WD, or 4WD Low modes, and disengaged when the mode is in neutral, or 2WD mode.

Front Axle Switch

This parameter displays either locked or unlocked depending on the feedback from the front axle actuator switch, which will be battery voltage when the vehicle is in a 4WD or Auto 4WD mode.

Incremental Impulse Sensor

This parameter displays the direction the incremental sensor is moving as clockwise or counter clockwise.

Incremental Position Sensor Direction

This parameter displays the pulse width modulated voltage signal being supplied to the incremental sensor via the transfer case control module.

Incremental Position Sensor

This parameter displays the position of the incremental sensor in degrees.

Incremental Position Sensor

This parameter displays the position of the incremental sensor in incremental sensor return voltage.

Mode Switch Return Voltage

This parameter displays the transfer case shift control switch return voltage from 0-7.5 volts.

Mode Switch Selected

This parameter displays the transfer case shift control switch mode currently selected by the driver.

Mode Switch Selected

This parameter displays the voltage being supplied to the transfer case shift control switch by the transfer case control module from 0-7.5 volts.

Motor Brake

This parameter displays the voltage being supplied to the transfer case motor brake via the transfer case control module from 0 to battery voltage.

Neutral Indicator Light

This parameter displays On when the transfer case shift control module commands the neutral indicator light On. The scan tool displays On or Off.

Rotational Position Sensor

This parameter displays the position of the rotational position sensor in degrees.

Rotational Position Sensor

This parameter displays the position of the rotational position sensor by displaying the rotational position sensor return voltage as read by the transfer case control module.

Run/Crank

This parameter displays the status of the run/crank signal to the transfer case control module as active or inactive.

Transfer Case Lock

This parameter displays the status of the transfer case lock as engaged or disengaged, the lock will be engaged in auto 4WD, 4WD, or 4WD low and disengaged in 2WD and neutral.

Transfer Case Motor

This parameter displays the current draw in amperage that the motor is currently drawing from the transfer case control module.

Transfer Case Position

This parameter displays the current mode the transfer case is in as indicated by the transfer case control module.

Trans. Fluid Temp.

This parameter displays the transmission fluid temperature in degrees Celsius.

TR Switch Status

This parameter displays the current gear the transmission is in.

Vehicle Speed

This parameter displays vehicle speed in kilometers per hour.

Software Part Number

This parameter displays the numbers or characters assigned to the current version of software used in the transfer case shift control module. The scan tool displays an alphanumeric value.

Total Slippage

This parameter displays the total slippage of both the front and rear propshafts. The scan tool displays a range of 0-8,192 RPM.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

DTC	Modules
DTC B0770	Electronic Transfer Case
DTC B0775	Electronic Transfer Case

DTC B0780	Electronic Transfer Case
DTC B0785	Electronic Transfer Case
DTC B0790	Electronic Transfer Case
DTC B2725	Electronic Transfer Case
DTC C0306	Electronic Transfer Case
DTC C0321	Electronic Transfer Case
DTC C0379	Electronic Transfer Case
DTC C0387	Electronic Transfer Case
DTC C0392	Electronic Transfer Case
DTC C0396	Electronic Transfer Case
DTC C0397	Electronic Transfer Case
DTC C0398	Electronic Transfer Case
DTC C0550	Electronic Transfer Case
DTC C0569	Electronic Transfer Case
DTC C0896	Electronic Transfer Case

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 Descriptor

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	Signal Performance
	DTC B0770	DTC B0770	DTC B0770	

AWD Indicator Circuit	06	06	01	-

Circuit/System Description

The All Wheel Drive (AWD) indicator circuit consists of an indicator lamp feed circuit and an AWD indicator lamp control circuit. When the AWD mode has been selected, current is supplied to the AWD indicator lamp by the indicator lamp feed circuit, traveling through the AWD indicator lamp LED, at which time the transfer case shift control module supplies the ground through the AWD indicator lamp control circuit.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10-18 volts.

Conditions for Setting the DTC

- The system monitors the voltage on the AWD indicator control circuit.
- If the system detects a voltage of 2 volts or less for 1.5 seconds when the AWD indicator is not commanded, the DTC is logged.
- If the system detects a voltage of 4.5 volts or more when the AWD indicator is commanded, the DTC is logged.

Action Taken When the DTC Sets

The SERVICE 4WD indicator is not commanded on for this DTC.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

Diagnostic Aids

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 will cause the AWD indicator to be inoperative during the 2 second bulb check.

Circuit/System Testing

Check the interior dimming circuit pin 2 at the transfer case shift control switch for voltage for the 2 seconds after turning the ignition on during the bulb check.

- If less than battery voltage check the interior dimming circuit for an open or high resistance. If the voltage is low or non existence and the circuit tests good replace the BCM. If the interior dimming circuit and BCM test good go to the next step.
- If the AWD indicator is on at all times check the AWD indicator control circuit for a short to ground. If the AWD indicator is inoperative during bulb check, check the AWD indicator control circuit for an open or high resistance or short to voltage. If the circuit checks good continue to the next step.
- With the ignition on shift the transmission to neutral and using transfer case output controls attempt to command the AWD indicator off and on. If the AWD indicator is still inoperative short to AWD indicator to ground, if the AWD indicator lights replace the module. If the AWD indicator is still inoperative replace the switch.

Repair Procedures

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

- **Transfer Case Shift Control Switch Replacement (Without SLT)** or **Transfer Case Shift Control Switch Replacement (With SLT)**
- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset**

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 Descriptor

DTC B0775 01

4 High Indicator Circuit Short to Battery

DTC B0775 06

4 High Indicator Circuit Short to Ground or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
4 High Indicator Circuit	DTC B0775 06	DTC B0775 06	DTC B0775 01	-

Circuit/System Description

The 4 high indicator circuit consists of an indicator lamp feed circuit and an 4 high indicator lamp control circuit. When the 4 high mode has been selected, current is supplied to the 4 high indicator lamp by the interior lights dimming circuit, traveling through the 4 high indicator lamp LED, at which time the transfer case shift control module supplies the ground through the 4 high indicator lamp control circuit.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10-18 volts.

Conditions for Setting the DTC

- The system monitors the voltage on the 4 high indicator control circuit.
- If the system detects a voltage of 2 volts or less for 1.5 seconds when the 4 high indicator is not commanded, the DTC is logged.
- If the system detects a voltage of 4.5 volts or more when the 4 high indicator is commanded, the DTC is logged.

Action Taken When the DTC Sets

The SERVICE 4WD indicator is not commanded on for this DTC.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Diagnostic Aids

A short to ground on the 4 high indicator control circuit will cause the 4 high indicator to remain on at all times. An open or high resistance will cause the 4 high indicator to be inoperative during the 2 second bulb check.

Circuit/System Testing

Check the interior dimming circuit pin 2 at the transfer case shift control switch for voltage for the 2 seconds after turning the ignition on during the bulb check.

- If less than battery voltage check the interior lights dimming circuit for an open or high resistance. If the voltage is low or non existent and the circuit tests good replace the BCM. If the interior dimming circuit and BCM test good go to the next step.
- If the 4 high indicator is on at all times check the 4 high indicator control circuit for a short to ground. If the 4 high indicator is inoperative during bulb check, check the 4 high indicator control circuit for an open or high resistance or short to voltage. If the circuit checks good continue to the next step.
- With the ignition on shift the transmission to neutral and using transfer case output controls attempt to command the 4 high indicator off and on. If the 4 high indicator is still inoperative short to 4 high indicator control to ground, if the 4 high indicator lights replace the module, program, and complete the motor learn procedure. If the 4 high indicator is still inoperative replace the switch.

Repair Procedures

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

- **Transfer Case Shift Control Switch Replacement (Without SLT)** or **Transfer Case Shift Control Switch Replacement (With SLT)**
- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset**

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 Descriptor

DTC B0780 01

4 Low Indicator Circuit Short to Battery

DTC B0780 06

4 Low Indicator Circuit Short to Ground or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
4 Low Indicator Circuit	DTC B0780 06	DTC B0780 06	DTC B0780 01	-

Circuit/System Description

The 4 low indicator circuit consists of an interior lights dimming circuit and an 4 low indicator lamp control circuit. When the 4 low mode has been selected, current is supplied to the 4 low indicator lamp by the interior lights dimming circuit, traveling through the 4 low indicator lamp LED, at which time the transfer case shift control module supplies the ground through the 4 low indicator lamp control circuit.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10-18 volts.

Conditions for Setting the DTC

- The system monitors the voltage on the 4 low indicator control circuit.
- If the system detects a voltage of 2 volts or less for 1.5 seconds when the 4 low indicator is not commanded, the DTC is logged.
- If the system detects a voltage of 4.5 volts or more when the 4 low indicator is commanded, the DTC is logged.

Action Taken When the DTC Sets

The SERVICE 4WD indicator is not commanded on for this DTC.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

- Circuit Testing
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- Wiring Repairs

Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

Diagnostic Aids

A short to ground on the 4 low indicator control circuit will cause the 4 low indicator to remain on at all times. An open or high resistance will cause the 4 low indicator to be inoperative during the 2 second bulb check.

Circuit/System Testing

Check the interior dimming circuit pin 2 at the transfer case shift control switch for voltage for the 2 seconds after turning the ignition on during the bulb check.

- If less than battery voltage check the interior lights dimming circuit for an open or high resistance. If the voltage is low or non existent and the circuit tests good replace the BCM. If the interior dimming circuit and BCM test good go to the next step.
- If the 4 low indicator is on at all times check the 4 low indicator control circuit for a short to ground. If the 4 low indicator is inoperative during bulb check, check the 4 high indicator control circuit for an open or high resistance or short to voltage. If the circuit checks good continue to the next step.
- With the ignition on shift the transmission to neutral and using transfer case output controls attempt to command the 4 low indicator off and on. If the 4 low indicator is still inoperative short to 4 low indicator control to ground, if the 4 low indicator lights replace the module, program, and complete the motor learn procedure. If the 4 low indicator is still inoperative replace the switch.

Repair Procedures

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

- **Transfer Case Shift Control Switch Replacement (Without SLT)** or **Transfer Case Shift Control Switch Replacement (With SLT)**
- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset**

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 Descriptor

DTC B0785 01

2 High Indicator Circuit Short to Battery

DTC B0785 06

2 High Indicator Circuit Short to Ground or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
2 High Indicator Circuit	DTC B0785 06	DTC B0785 06	DTC B0785 01	-

Circuit/System Description

The 2 high indicator circuit consists of an interior lights dimming circuit and an 2 high indicator control circuit. When the 2 high mode has been selected, current is supplied to the 2 high indicator by the interior lights dimming circuit, traveling through the 2 high indicator LED, at which time the transfer case shift control module supplies the ground through the 2 high indicator lamp control circuit.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10-18 volts.

Conditions for Setting the DTC

- The system monitors the voltage on the 2 high indicator control circuit.
- If the system detects a voltage of 2 volts or less for 1.5 seconds when the 2 high indicator is not commanded, the DTC is logged.
- If the system detects a voltage of 4.5 volts or more when the 2 high indicator is commanded, the DTC is logged.

Action Taken When the DTC Sets

The SERVICE 4WD indicator is not commanded on for this DTC.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.

- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Diagnostic Aids

A short to ground on the 2 high indicator control circuit will cause the 2 high indicator to remain on at all times. An open or high resistance will cause the 2 high indicator to be inoperative during the 2 second bulb check.

Circuit/System Testing

Check the interior dimming circuit pin 2 at the transfer case shift control switch for voltage for the 2 seconds after turning the ignition on during the bulb check.

- If less than battery voltage check the interior lights dimming circuit for an open or high resistance. If the voltage is low or non existent and the circuit tests good replace the BCM. If the interior dimming circuit and BCM test good go to the next step.
- If the 2 high indicator is on at all times check the 2 high indicator control circuit for a short to ground. If the 2 high indicator is inoperative during bulb check, check the 2 high

indicator control circuit for an open or high resistance or short to voltage. If the circuit checks good continue to the next step.

- With the ignition on shift the transmission to neutral and using transfer case output controls attempt to command the 2 high indicator off and on. If the 2 high indicator is still inoperative short to 2 high indicator control to ground, if the 2 high indicator lights replace the module, program, and complete the motor learn procedure. If the 2 high indicator is still inoperative replace the switch.

Repair Procedures

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

- **Transfer Case Shift Control Switch Replacement (Without SLT)** or **Transfer Case Shift Control Switch Replacement (With SLT)**
- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset**

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 Descriptor

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	Signal Performance
Neutral Indicator Circuit	DTC B0790	DTC B0790	DTC B0790	-

	06	06	01	

Circuit/System Description

The neutral indicator circuit consists of an ignition 1 voltage circuit and a neutral indicator control circuit. When the neutral mode has been selected, current is supplied to the neutral indicator by the ignition 1 voltage circuit, traveling through the neutral indicator LED, at which time the transfer case shift control module supplies the ground through the neutral indicator control circuit.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10-18 volts.

Conditions for Setting the DTC

- The system monitors the voltage on the neutral indicator control circuit.
- If the system detects a voltage of 2 volts or less for 1.5 seconds when the 2 high indicator is not commanded, the DTC is logged.
- If the system detects a voltage of 4.5 volts or more when the 2 high indicator is commanded, the DTC is logged.

Action Taken When the DTC Sets

The SERVICE 4WD indicator is commanded on for this DTC for the remainder of the ignition cycle.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

Diagnostic Aids

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 check.

Circuit/System Testing

Check the ignition 12 voltage reference circuit pin 2 at the transfer case shift control switch for voltage with the ignition on.

- If less than battery voltage check the 12 volt reference circuit pin 14 at the BCM and pin 2 on the transfer case mode switch for an open or high resistance. If the voltage is low or non existent and the circuit tests good replace the BCM. If the BCM test good go to the next step.
- If the neutral indicator is on at all times check the neutral indicator control circuit for a short to ground. If the neutral indicator is inoperative during bulb check, check the neutral indicator control circuit for an open or high resistance or short to voltage. If the circuit checks good continue to the next step.
- With the ignition on shift the transmission to neutral and using transfer case output controls attempt to command the neutral indicator off and on. If the neutral indicator is still inoperative short to neutral indicator control to ground, if the neutral indicator lights replace the module, program, and complete the motor learn procedure. If the neutral indicator is still inoperative replace the switch.

Repair Procedures

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

- **Transfer Case Shift Control Switch Replacement (Without SLT)** or **Transfer Case Shift Control Switch Replacement (With SLT)**
- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset**

DTC B2725

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 08

Active Transfer Case Mode Switch Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Active Transfer Case Mode Switch Circuit	DTC B2725 08	DTC B2725 08	DTC B2725 08	DTC B2725 08

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.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

- The system constantly monitors the voltage on switch signal circuit.
- If the system detects a voltage level under 0.38 volts or greater than 4.86 volts for 60 seconds, the DTC is logged.

Action Taken When the DTC Sets

- All shifting is disabled.
- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Diagnostic Aids

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 check.

Circuit/System Testing

The 5-volt reference circuit and the switch signal will have to be checked for shorts to ground, opens, high resistance, and shorts to voltage by following the below listed steps.

1. Reference the mode switch supply voltage with a scan tool.
    - The scan tool should indicate 4.8-5.2 volts. If the scan tool indicates the voltage is within this specification then with a jumper wire short the switch signal circuit pin 12 on the switch to the 5-volt reference circuit pin 11 on the switch. If the mode switch return voltage on the scan tool measures 4.8-5.2 volts then replace the switch.
2. If the mode switch return does not read 4.8-5.2 volts check the switch signal circuit and the 5-volt reference circuits for a short to ground, short to voltage, open, or high resistance.
    - If no shorts or high resistance are found on the switch signal or 5-volt reference circuits then replace the transfer case shift control module, reprogram, and complete the motor learn procedure.

Repair Procedures

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

- **Transfer Case Shift Control Switch Replacement (Without SLT)** or **Transfer Case Shift Control Switch Replacement (With SLT)**
- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset**

DTC C0306

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 C0306 02

Motor A or B Circuit Short to Ground

DTC C0306 05

Motor A or B Circuit Short to Battery or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Motor A or B Circuit	DTC C0306 02	DTC C0306 05	DTC C0306 05	-

Circuit/System Description

The transfer case motor is a bi-directional, permanent magnet, DC motor. When energized, through motor control A or motor control B, the ground is provided by the opposing motor control circuit and then grounded through the transfer case shift control module ground circuit, the motor, through a series of gears, rotates a shaft which moves the mode and range forks to shift the transfer case between the following modes or ranges:

- 2HI
- 4HI
- 4LO
- AUTO 4WD
- Neutral

This DTC detects an open, short to voltage, or short to ground in the motor control A or motor control B circuits, or an open, or short to ground inside the motor.

Conditions for Running the DTC

- The ignition is ON.

- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

- The system tests the motor circuits by checking for unwanted voltage.
- Then, the system supplies voltage on each of the motor circuits and reads the voltage back on the other circuit.
- If the system detects a condition with the circuits, the DTC is logged. The transfer case shift control module senses a low voltage return in the motor control A or motor control B circuits when a high voltage is expected.
- The fault must remain current for 30 seconds to set the DTC.

Action Taken When the DTC Sets

- All shifting is disabled.
- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

- **Wiring Repairs**

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

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.

Circuit/System Testing

The motor A control and motor B circuits need to be checked for shorts to ground, opens, high resistance, and shorts to voltage by following the below listed steps.

1. With the ignition off disconnect connector X3 from the transfer case control module, and also disconnect the connector at the transfer case actuator.
    - With a DMM check the motor A control and motor B control circuits for an open, high resistance, or short to ground and repair as necessary. If all check good go to the next step
2. Connect X3 at the transfer case control module and turn on the ignition.
    - Check to motor A control and motor B control circuits for a short to voltage. If the circuits shows to indication of a short to voltage go to component testing.

Component Testing

1. Turn the ignition of and check the motor windings for an internal short to ground inside the motor by probing either the motor A control pin and taking the other lead to ground, or the same can be done using motor B control pin. Motor control A is pin A and motor B control is pin D.
    - If the DMM indicates and short to ground replace the transfer case actuator. If nothing is found continue to the next step.
2. With a DMM check the resistance of the motor windings by probing pin A and pin D on the transfer case actuator.
    - The DMM should indicate 0.3-40 ohms, if it does not replace the transfer case actuator and complete the motor learn procedure. If the actuator is within specifications then replace the transfer case control module, program, and complete the motor learn procedure.

Repair Procedures

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**
- **Transfer Case Two/Four Wheel Drive Actuator Replacement**

DTC C0321

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 C0321 01

Transfer Case Lock Circuit Short to Battery

DTC C0321 02

Transfer Case Lock Circuit Short to Ground

DTC C0321 04

Transfer Case Lock Circuit Open

DTC C0321 08

Transfer Case Lock Circuit Signal Invalid

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Transfer Case Lock Circuit	DTC C0321 02	DTC C0321 04	DTC C0321 01	DTC C0321 08

Circuit/System Description

The transfer case shift control module controls the transfer case lock solenoid.

The transfer case lock solenoid is released by being energized. This is accomplished by grounding the lock solenoid control circuit during gears shifts, and in the AUTO 4WD mode. Locking action is applied when power or ground are taken away from the lock solenoid, the transfer case motor is prevented from moving. The system is capable of providing a 2HI, 4HI and 4LO lock-up without the need of additional vehicle power to hold the transfer case in these positions.

This DTC detects an open lock solenoid coil, open motor lock control circuit, or an open batter positive voltage circuit, or a short to voltage or ground on the lock solenoid control circuit.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

- The transfer case shift control module tries to unapply, turn OFF the lock solenoid by grounding the motor control circuit.
- If the module does not sense the battery voltage at the motor lock control circuit prior to applying the motor lock, the DTC sets.
- Transfer Case Lock control reads back as a high voltage when a low voltage is expected.

Action Taken When the DTC Sets

- All shifting is disabled for failure types 01 and 04, normal shifting can occur for failure types 02 and 08.
- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

Diagnostic Aids

When the circuits operating the lock solenoid are not complete the lock is engaged. When the circuit is completed the lock is disengaged.

Circuit/System Testing

The battery positive voltage circuit and the lock solenoid control circuit must be tested for opens, shorts to ground, shorts to voltage, and high resistance. This can also result from a electrically faulted solenoid.

1. With the ignition on check which DTC is set. If DTC C0321 is set with failure type byte 04 then do the following.
    - The transfer case lock is unable to hold during a hold test and the transfer case actuator will need to be replaced, and the motor learn procedure performed. If this is not the case continue to the next step.
2. Disconnect the transfer case actuator, turn on the ignition and with a DMM check the battery positive voltage circuit for battery voltage at the transfer case actuator.
    - If battery voltage is not seen then repair the battery positive voltage circuit for an open or high resistance. If the circuit checks out proceed to the next step.
3. Disconnect the transfer case control module connector X2 and check the circuit for an open, high resistance, short to ground, or short to voltage. If condition is found repair the circuit

or inline connector 109 as necessary, if the condition is not found refer to component testing.

Component Testing

With the ignition off check the resistance of the lock solenoid with a DMM by probing Pins C and B on the transfer case actuator.

- If the resistance reads 16-42 ohms then replace the transfer case control module, program, and complete the motor learn procedure. If the resistance is not in range then replace the transfer case actuator, and complete the motor learn procedure.

Repair Procedures

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**
- **Transfer Case Two/Four Wheel Drive Actuator Position Sensor Replacement**

DTC C0374

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 C0374 54

General System Performance Temperature High

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
General System Performance	C0374 54	-	-	-

Circuit/System Description

The general system performance DTC sets based on a thermal module within the transfer case shift control module software. The components included in this thermal model are the motor driver within the transfer case shift control module, the shift motor, and the clutch inside the transfer case.

The General System Performance includes the following components:

- The transfer case shift control module
- The transfer case clutch
- The transfer case shift motor

This fault occurs when one of the three components included in the thermal model surpass the upper limits of this model indicating possible damage to the transfer case or other driveline components. This DTC detects an over temperature condition base on a thermal model.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.
- DTC C0896 is not set.

Conditions for Setting the DTC

This DTC sets if one of three components: motor driver inside the transfer case shift control module, transfer case clutch, or the shift motor, exceed the thermal model within the software for the module.

Action Taken When the DTC Sets

- All range and mode changes will be disabled while the DTC is current.
- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm-up cycles without a fault present.
- History and current DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Circuit/System Testing

The DTC can be set by more than one type of fault. It could be set by faulty wheel speed sensors, a front axle actuator not mechanically engaging, a worn transfer case clutch, or a motor brake not holding properly causing excessive motor engagement.

1. This system compares front wheel speeds to rear wheel speeds to determine if slip is occurring and clutch engagement is necessary to correct this condition if the front axle actuator has not mechanically engaged this slip correction can not happen and the DTC will set.
    - Place the vehicle on a hoist, turn the ignition on, engine off and shift the transfer case to 2WD. With a scan tool command the front axle actuator on using special functions in the scan tool. While one person is holding one of the front tires still, spin the other front tire if the front propshaft turns then the front axle is engaged. If it is engaged go to the next step. If not, tear down and inspect the front axle clutch fork for mechanical binding.
2. Using the scan tool, go into EBCM data display and find the front and rear.
    - Take the vehicle on a short test drive on a level and smooth surface. Compare the front wheel speeds to the rear wheel speeds. If the wheel speeds are erratic or they drop out,

this would cause this DTC to set. Consider checking the EBCM for DTCs for the wheel speeds. If the wheel speeds are erratic, use the DTC diagnostics in antilock brakes to diagnose the condition. If this appears normal, to too the next step.

3. The next check will be to see if the motor brake is holding. If it does not, this will cause the motor to stay engaged for extended periods of time causing it to exceed the thermal model.
    - With a scan tool clear the DTC, shift the vehicle to 2WD, and monitor the transfer case motor amperage using the data display. Shift the vehicle to the 4 high mode if the amperage goes up while the motor is shifting and goes back to 0 amps in 5 seconds or less then the brake is holding. If the amperage stays high longer, this indicates the brake is not holding and the actuator will need to be replaced. If the brake holds, go to the next step.
4. Next will be checking the transfer case clutch integrity.
    - Place the vehicle for 4 high and take it for a test drive. Clear the DTC if possible. Monitor front and rear wheel speeds using the EBCM data display. Under heavy acceleration, monitor the front and rear wheel speeds. If the front wheel speeds are much lower, this indicates a weak clutch and a transfer case tear down and inspection will be required. If all of the above check all check out good replace the transfer case shift control module if the DTC continues to set and perform the motor learn procedure/Transfer Case High/Low Clutch Reset.

Repair Procedures

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** for Motor Learn Procedure
- **Four-Wheel Drive Does Not Engage**
- **Front Drive Axle Clutch Fork Inspection**
- **Transfer Case Assembly Replacement**

DTC 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 Descriptor

DTC C0379 01

Front Axle System Short to Battery

DTC C0379 02

Front Axle System Short to Ground

DTC C0379 04

Front Axle System Open Circuit

DTC C0379 08

Front Axle System Signal Invalid

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Front Axle System	DTC C0379 02	DTC C0379 04	DTC C0379 01	DTC C0379 08

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.

This DTC detects a short to ground, short to voltage or an open circuit.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

- This DTC sets if the front axle actuator switch shows battery voltage when the actuator is disengaged, or when the front axle actuator shows no voltage when the actuator is engaged.
- The module also monitors the axle actuator control circuit and sets the DTC if a high voltage is expected (disengaged) and a low voltage is seen. It will also set when a low voltage is expected (engaged) and a high voltage is seen.

Action Taken When the DTC Sets

- The front axle may be engaged at all times or disengaged at all time depending on the failure type.
- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Circuit/System Testing

The Ignition 1 voltage circuit and the axle actuator control circuit must be tested for opens, shorts to ground, shorts to voltage, and high resistance. This can also result from a electrically faulted actuator.

1. With the ignition on check which DTC is set. If DTC C0379 is set with failure type byte 08 then do the following.
    - Shift the vehicle into 4 high and look at the scan tool data list to see if the front axle actuator is engaging. If the axle actuator can be heard engaging but the scan tool still indicates disengaged then check the axle switch signal circuit for an open or high resistance. Shift the vehicle to 2 high, if the scan tool indicates the axle actuator is engaged then check the axle switch signal for a short to voltage. If everything checks out go to the next step.
2. Remove the front axle actuator and try to shifting from 4WD to 2WD and see if the states change.
    - If the states change then inspect the front axle for mechanical conditions. Refer to **Four-Wheel Drive Does Not Engage** or **Four-Wheel Drive Does Not Disengage** . If this checks out then go to the next step.
3. Disconnect the connector at the front axle actuator and check for battery voltage on the ignition 1 circuit. Also check the front axle actuator ground for proper connections.
    - If these circuit test bad repair as necessary checking inline connectors X110 and X109. If these circuits test good go to the next step.
4. Check the axle actuator control circuit for an open, short to ground, or short to voltage.
    - If the actuator control circuit checks good, then short the actuator control circuit to ground at the transfer case control module connector X1 pin 15. This should cause the actuator to engage, remove the ground and then reinstate the ground and the actuator should disengage. If the front axle actuator engages and disengages then replace the

transfer case control module, program, and complete the motor learn procedure. If it does not fully engage or disengage then replace the front axle actuator.

Repair Procedures

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**
- **Four-Wheel Drive Does Not Engage**
- **Four-Wheel Drive Does Not Disengage**
- **Front Drive Axle Actuator Replacement**

DTC C0387

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 C0387 59

Unable to Complete Shift Circuit/Component Protection Timeout

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Circuit/Component Timeout
Unable to Complete Shift	-	-	-	DTC C0387 59

Circuit/System Description

The transfer case control module commands shifts through motor A and motor B control circuits causing the transfer actuator to shift the transfer case to different modes or ranges depending on driver selection. 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 system components from damage.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

A shift request was received but could not be completed within 15 seconds causing this DTC to set.

Action Taken When the DTC Sets

- All shifting is disabled until condition is corrected.
- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Diagnostic Aids

Motor control A shorting to motor control B could cause this DTC.

Circuit/System Testing

1. Ignition off with a DMM check to see if motor A control and motor B control are shorted together after disconnecting the transfer case control module and the transfer case actuator.
   - If motor A control is shorted to motor B control repair circuits as necessary. If the circuits checked good go to next step.
2. Remove the transfer actuator and check to see if the shift detent shaft is binding.
   - If the shift lever detent shaft is binding refer to **Transfer Case Disassemble**. If the shift lever detent shaft is not binding replace the transfer case actuator.

Repair Procedures

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

- **Transfer Case Two/Four Wheel Drive Actuator Replacement**
- **Transfer Case Disassemble**

DTC C0392

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 C0392 01

Rotational Position Sensor Circuit Short to Battery

DTC C0392 02

Rotational Position Sensor Circuit Short to Ground

DTC C0392 08

Rotational Position Sensor Circuit Signal Invalid

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Rotational Position Sensor Circuit	DTC C0392 02	-	DTC C0392 01	DTC C0392 08

Circuit/System Description

The transfer case shift control module has an input from the transfer case two/four wheel drive actuator position sensor otherwise know as a rotational position sensor (RPS). This sensor sends the transfer case control module a pulse width modulated signal which will vary constantly indicating the position of the transfer case actuator. This sensor also receives a 5-volt reference signal from the transfer case control module. This sensor works in conjunction with the incremental sensor which is inside the transfer case actuator. This sensor is more sensitive then the incremental position sensor and indicates the exact position of the transfer case actuator, showing the transfer case control module when the transfer case is between modes or ranges. It can also show how much clutch activation is being commanded at any time.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

- The transfer case control module sees a PWM (RPS) voltage that does not constantly change but remains high 5 volts or above indicating a short to voltage. Or it may remain low indicating a short to ground 0.5 volts or less.
- The module does not receive a 5-volt reference of 4.8-5.2 volts.
- The RPS low reference circuits has an open or high resistance causing a low voltage situation.

Action Taken When the DTC Sets

- All shifting is disabled until the condition no longer exists.
- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

Diagnostic Aids

A RPS signal voltage that remains low 0.5 or lower indicates a short to ground on the RPS signal voltage circuit. It can also indicate an open or high resistance on the RPS low reference signal circuit.

Circuit/System Testing

The RPS 5-volt reference circuit, RPS low reference circuit, and RPS sensor signal circuits should be checked for shorts to ground, shorts to voltage, and opens or high resistance.

1. With the ignition on check the RPS 5-volt reference signal on the RPS connector pin 8 with the connector disconnected using a DMM.
    - The DMM should indicate 4.8-5.2 volts, if the voltage is low check for an open or high resistance or short to ground. If the voltage indicates the voltage is over the specification check for a short to voltage. If the circuit checks good replace the transfer case control module, program, and complete the motor learn procedure. If the circuit checks good with the RPS disconnected, connect the RPS and see if the DTC still show as current. If it does proceed to the next step.
2. With the transfer case shift control module connector X1 and X2 disconnected and the RPS disconnected check the RPS signal circuit and the RPS low reference circuits for shorts to ground, high resistance, or shorts to voltage.
    - If a shorting condition has been found then repair the circuits as necessary. If nothing is found in circuit testing then replace the RPS, and perform the motor learn procedure.

Repair Procedures

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**
- **Transfer Case Two/Four Wheel Drive Actuator Position Sensor Replacement**

DTC C0396

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 C0396 01

Incremental Position Sensor Circuit Short to Battery

DTC C0396 02

Incremental Position Sensor Circuit Short to Ground

DTC C0396 04

Incremental Position Sensor Open Circuit

DTC C0396 05

Incremental Position Sensor Circuit Short to Battery or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Incremental Position Sensor Circuit	DTC C0396 02	DTC C0396 04 DTC C0396 05	DTC C0396 01 DTC C0396 05	-

Circuit/System Description

The transfer case shift control module has an input from incremental sensor which shows the speed, transfer case range, and direction of the transfer case mode or range shifts. The incremental sensor is an integral part of the transfer case actuator and can not be replaced independently. This sensor works in conjunction with the RPS sensor to know the exact position of the transfer case actuator. The incremental sensor is less sensitive overall then the RPS, but still indicates important information about the speed and direction of the transfer case two/four wheel drive actuator position. This sensor receives an 8-volt reference signal from the transfer case control module and gets this data back via the transfer incremental impulse signal, as well as the incremental direction signal in order to know is current location.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

- The transfer case control module sees a incremental 8-volt reference signal that is not between 1.5-8.2 volts indicating a short to ground or open if low and a short to voltage if high.
- The module does not receive a incremental impulse signal voltage between 0.5-4.6 volts.
- The incremental low reference circuit has an open or high resistance.

Action Taken When the DTC Sets

- All shifting is disabled until the condition no longer exists.
- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Diagnostic Aids

An open, high resistance, or short to voltage on the incremental sensor direction signal circuit will cause this DTC to set. If the sensor is determined to be bad the entire transfer case actuator will have to be replaced as the incremental sensor is part of the actuator and can not be replaced independently.

Circuit/System Testing

The incremental sensor impulse signal circuit, incremental direction signal circuit, incremental sensor low reference circuit, and the 8-volt reference circuit will need to be check for a short to ground, open, high resistance, and a short to voltage using the following steps.

1. Disconnect the connector at the transfer case actuator and check the 8-volt reference signal on pin G at the transfer case actuator with a DMM, ignition on, the voltage should read 7.8-8.2 volts.
    - If the voltage does not read within the specifications then check the 8-volt reference circuit for a short to voltage, open, high resistance, or short to ground. If the circuit checks good and the voltage is out of range replace the transfer case control module, program, and perform the motor learn procedure. If the circuit checks good continue to next step.
2. At the transfer case actuator, with a jumper harness short the 8-volt reference circuit pin G to the incremental impulse signal pin E and note the voltage on the scan tool data display.
    - If the voltage does not read 7.8-8.2 volts check the incremental impulse signal circuit for and open, high resistance, short to ground, or short to voltage. If the circuit checks good then go to the next step.
3. Check the incremental direction circuit for an open, short to ground, high resistance, or a short to voltage by probing pin F at the transfer case actuator and pin 14 and transfer case control module connector X2.
    - If all circuit test good replace the transfer case actuator and perform the motor learn procedure.

Repair Procedures

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**
- **Transfer Case Two/Four Wheel Drive Actuator 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 64

Transfer Case Clutch Performance Actuator Slipping

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Actuator Slipping
Transfer Case Clutch Performance	-	-	-	DTC C0397 64

Circuit/System Description

The transfer case in the Auto 4WD mode attempts to correct for slip by monitoring the front and rear wheel speed sensors. If the transfer case is unable to correct for slip when there is a difference between the front and rear speed sensors the transfer case will apply the clutch. If the transfer case in unable to correct this slip and the clutch begins to heat up based on a thermal model inside the transfer case control module this DTC will be set.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

The transfer case is unable to correct slip due to a clutch overheat condition as a result in surpassing the thermal model that is stored in the transfer case control module.

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.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Diagnostic Aids

Motor control A shorting to motor control B could cause this DTC.

Circuit/System Testing

Check for EBCM DTCs as an incorrect speed sensor reading could cause this issue. If no other DTCs are found then refer to **Transfer Case Disassemble** to inspect for possible clutch damage.

Repair Procedures

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

Transfer Case Disassemble

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 5A

Incremental Sensor - Rotational Position Sensor Correlation Plausibility Failure

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Actuator Plausibility Failure
Incremental Sensor - Rotational Position Sensor Correlation Plausibility	-	-	-	DTC C0398 5A

Circuit/System Description

The transfer case incremental position sensor and the rotational position sensor are both input to the transfer case control module as to the range or mode the transfer case is in. Both sensors are capable of showing position by degrees. If the two sensors disagree by 5 percent or more this DTC will set.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

Both sensors must be showing a valid position at the time the DTC is set.

Action Taken When the DTC Sets

- Shifting is still disabled until the DTC has cleared itself.

- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

Diagnostic Aids

Each of the two sensors show the transfer case movement in degrees. Find the sensor either the incremental sensor or the RPS that seems to not be showing a reading in degrees and is doing so erratically this is probably the sensor causing the DTC.

Circuit/System Testing

Inspect the RPS sensor for damage at the mating surface with the rotational position shaft.

1. If the RPS sensor shows damage at the mating surface then replace the RPS sensor. If no damage is found attempt to turn the shaft while the transfer case in stationary in one mode.
2. If the shaft can be turned then internal damage has occurred to this shaft, refer to transfer case disassemble and inspection and repair as necessary. If no damage is found and the RPS sensor seems to show a steady degrees rotation reading on the scan tool data list then replace the transfer case two/four wheel drive actuator.

Repair Procedures

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

- **Transfer Case Disassemble**
- **Transfer Case Two/Four Wheel Drive Actuator Replacement**
- **Transfer Case Two/Four Wheel Drive Actuator Position Sensor Replacement**

DTC C0550

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 C0550 37

Electronic Control Unit Malfunction Watchdog/Safety Failure

DTC C0550 39

Electronic Control Unit Malfunction Internal Electronic Failure

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Watchdog/Safety Failure	Internal Electronic Failure
Electronic Control Unit Malfunction	-	-	DTC C0550 39	DTC C0550 39

Circuit/System Description

This DTC indicates and RAM/ROM checksum, a EEPROM failure, or an ECU malfunction due to an internal microprocessor failure.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

The EEPROM, RAM and ROM, and ECM Microprocessor do self checks against one another and the data does not match causing the DTC to set.

Action Taken When the DTC Sets

- Shifting is still disabled until the DTC has cleared itself.
- 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 if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Diagnostic Aids

It is sometimes possible to set this DTC falsely due to low voltage. Attempt to clear this DTC and retest.

Circuit/System Testing

If this DTC sets attempt to clear the DTC and Retest.

- If the DTC is cleared, but then resets then replace the transfer case control module, program, and complete the transfer case motor learn procedure.

Repair Procedures

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**

DTC C0569

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 C0569 4B

System Configuration Error Calibration Data Not Learned

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Watchdog/Safety Failure	Internal Electronic Failure
Electronic Control Unit Malfunction	-	-	DTC C0550 39	DTC C0550 39

Circuit/System Description

This DTC is set anytime a new transfer case shift control module is installed. The transfer case motor learn procedure must be performed to erase this DTC. The DTC must learn the amount of clutch tolerance depending on clutch stackup and the amount of wear the clutches have accumulated.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18 volts.

Conditions for Setting the DTC

The motor learn procedure for a new module has not been performed.

Action Taken When the DTC Sets

- Shifting is still disabled until the motor learn procedure has been performed.
- The SERVICE 4WD indicator does not light for this DTC.

Conditions for Clearing the DTC

The transfer case shift control module clears the DTC if the motor learn procedure has been successfully performed.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Diagnostic Aids

Perform the motor learn procedure before normal operation will occur.

Circuit/System Testing

Perform the motor learn procedure.

Repair Procedures

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

Transfer Case High/Low Clutch Reset

DTC C0896

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 C0896 03

Device Voltage Range Voltage Below Threshold

DTC C0896 07

Device Voltage Range Voltage Above Threshold

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Voltage Below Threshold	Voltage Above Threshold
Device Voltage Range	-	-	DTC C0896 03	DTC C0896 07

Circuit/System Description

This DTC is set up to detect a high or low voltage situation. This could indicate a vehicle issue in which all electrical components would be affected. It could also be transfer case control module specific do to poor power or ground connections.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 10.5-18.5 volts.

Conditions for Setting the DTC

The voltage is above 18.5 volts or below 10.5 volts for 15 seconds.

Action Taken When the DTC Sets

- Shifting is disabled until the voltages change to be within the specifications.
- The SERVICE 4WD will illuminate for the remainder for the ignition cycle.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

Diagnostic Aids

Perform the motor learn procedure before normal operation will occur.

Circuit/System Testing

1. If the voltage is low check the voltage on other vehicle systems to determine if this is a vehicle wide condition and take appropriate actions. If this is transfer case specific check the ignition 3 feed to the transfer case control module and the ground for the transfer case control module for proper connections.
2. If the voltage is high, this is likely a vehicle issue such as an alternator problem or the vehicle has been hooked up improperly during a jump start.
3. After the condition is corrected perform the motor learn procedure.

Repair Procedures

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

Transfer Case High/Low Clutch Reset

DTC P2160 OR P2161

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 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
VSS Supply Voltage	P2160, P2161	P2160, P2161	P2160, P2161	P2161
VSS Signal	P2160, P2161	P2160, P2161	P2160, P2161	P2161

Circuit/System Description

The vehicle speed sensor (VSS) provides vehicle speed information to the engine control module (ECM). The VSS is a permanent magnet generator. The sensor is mounted in the transfer case facing the rear internal gear which is splined to the output shaft assembly. As the output shaft and internal gear rotate, the toothed rotor of the internal gear produces AC voltage as the rotor teeth pass through the magnetic field of the sensor. The AC voltage level and the number of pulses increase as the speed of the vehicle increases. The ECM converts the voltage to vehicle speed. The ECM uses the output shaft speed signal to determine shift timing and torque converter clutch (TCC) scheduling, as well as transfer case range.

Conditions for Running the DTC

P2160

- No input speed sensor (ISS) DTCs P0716 or P0717.
- No OSS DTCs P0722 or P0723.
- No transmission fluid pressure (TFP) DTCs P1810, P1815, P1816, or P1818.

- The transmission is not in PARK or NEUTRAL.
- Transmission fluid temperature (TFT) is between -40° to +150°C (-40° to +302°F).
- The throttle position is 8 percent or greater.
- The engine torque is greater than 50 N.m (37 lb ft).
- The input speed is greater than 1,500 RPM.
- The TCC slip speed is at least -20 RPM.

P2161

- No 1-2 Shift Solenoid Electrical DTC P0974.
- No ISS DTCs P0716 or P0717.
- The transmission is not in PARK or NEUTRAL.
- The transmission output speed is greater than 1,400 RPM for 2 seconds or greater.
- One of the following conditions exist:
  - The transmission input shaft speed has changed less than 500 RPM for at least 2 seconds.
  - The transmission output shaft speed has not increased at least 500 RPM for at least 2 seconds.

Conditions for Setting the DTC

P2160

The transfer case output shaft speed is 50 RPM or less for 4.5 seconds.

P2161

The transfer case output shaft speed drops 1,200 RPM or greater for at least 3.25 seconds.

Action Taken When the DTC Sets

- DTCs P2160 and P2161 are Type B DTCs.
- The TCM commands maximum line pressure.
- The TCM freezes transmission adaptive functions.
- The TCM calculates vehicle speed from the automatic transmission input shaft speed sensor and commanded gear.

Conditions for Clearing the DTC

DTCs P2160 and P2161 are Type B DTCs.

Diagnostic Aids

- Inspect the rear internal gear teeth for damage.
- Visually inspect the VSS for cracks or damage.
- Ensure the VSS is properly torqued to the transfer case housing.
- This diagnostic relates to the VSS located in the transfer case and not the OSS located within the transmission.

Reference Information

Schematic Reference

- **Transfer Case Control Schematics**
- **Engine Controls Schematics**

Connector End View Reference

Component Connector End Views

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. Raise and support the drive wheels.
2. Start and idle the engine.
3. Place the transmission in DRIVE.
4. Monitor VSS on the scan tool under engine data.
5. The VSS on the scan tool should be greater than 100 RPM.

Circuit/System Testing

1. Measure the resistance between the VSS high signal circuit and the VSS low signal circuit. The resistance should be between 1,420-2,140 ohms.
    - If the value is greater than 2,140 ohms, test the VSS high signal circuit and the VSS low signal circuit for an open.
    - If the value is less than 1,420 ohms, test the VSS high signal and the VSS low signal circuits for a shorted together condition.
2. Measure the resistance of the VSS high signal circuit to ground. The resistance should be greater than 10M ohms.
    - If the value is less than 10M ohms, repair the short to ground.
3. Measure the resistance between the VSS low signal circuit and ground. The resistance should be greater than 10M ohms.
    - If the value is less than 10M ohms, repair the short to ground.
4. Reconnect the ECM connector. Disconnect the VSS connector. Ignition ON, test the ISS high signal circuit for a short to voltage.
    - If all circuits/connections test normal, test or replace the VSS.
5. If all previous steps for circuit checking and VSS replacement have been made and all component testing has been performed and the condition persists replace the ECM.

Component Testing

1. Verify the VSS resistance is within the specified range.
2. Using a terminal test kit, connect the DMM between the VSS high signal and the VSS low signal circuits at the VSS connector. Raise and support the drive wheels. While rotating the drive wheels by hand ensure the AC voltage reading on the DMM is above 0.4 volts.
    - If the AC voltage is not above 0.4 volts, replace the VSS.

Repair Procedures

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

- Ensure that the VSS is 500 RPM or greater for 3 seconds and does not change more than 500 RPM or greater for 3 seconds.
- **Vehicle Speed Sensor Replacement**
- **Control Module References** for ECM replacement, setup, and programming.

SYMPTOMS - TRANSFER CASE

IMPORTANT:

- **Perform the Diagnostic System Check - Vehicle before using the symptom tables in order to verify the following statements are true:**
  - **There are no diagnostic trouble codes (DTCs) set.**
  - **The control modules can communicate via the serial data link.**
- **Review the system operation in order to familiarize yourself with the system functions. Refer to 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 cause 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:

- **Front Axle Will Not Engage**
- **Front Axle Will Not Disengage**

- **Transfer Case Shift Control Switch Inoperative**
- **No Correction for Slip in All-Wheel Drive Mode**
- **Transfer Case Shift Control Switch Indicator Always On - Two or More**
- **Transfer Case Shift Control Switch Indicator Inoperative - One or More**
- **Service Indicator Always On**
- **Transfer Case High/Low Clutch Reset**
- **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 Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

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 Procedures

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**
- **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 Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

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 Procedures

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**
- **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 Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

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 Procedures

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

- **Transfer Case Shift Control Switch Replacement (Without SLT)** or **Transfer Case Shift Control Switch Replacement (With SLT)**
- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset**

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 Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

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 warn. Refer to **Transfer Case Disassemble**.

Repair Procedures

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

Transfer Case Disassemble

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 Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

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 Procedures

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

- **Transfer Case Shift Control Switch Replacement (Without SLT)** or **Transfer Case Shift Control Switch Replacement (With SLT)**
- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset**

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 Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

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 Procedures

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

- **Transfer Case Shift Control Switch Replacement (Without SLT)** or **Transfer Case Shift Control Switch Replacement (With SLT)**
- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset**

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 Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

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 Procedures

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**

TRANSFER CASE HIGH/LOW CLUTCH RESET

Using a Scan Tool

1. Turn the ignition on go to the special functions heading in the scan tool.
2. Select Clutch Reset Procedure (Motor Learn Procedure).
3. When the Clutch Reset Procedure is initiated you should hear the motor engage, indicating a successful learn procedure.

Using The Transfer Case Shift Control Switch

1. Turn the ignition to accessory, place the switch into the 2 high mode.
2. Turn the switch clockwise past 4 low into the neutral request mode and hold for 30 seconds.
3. An audible noise from the motor should occur indicating a successful learn procedure.

TRANSFER CASE POPPING NOISE

Cause	Correction
DEFINITION: A faulty internal transfer case component that causes a popping noise in the transfer case. Review the **Symptoms - Transfer Case** and perform the necessary inspections.	
Chain jump	• Replace the chain and sprockets. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**. • Replace the shaft bearings. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**. • Inspect for damaged components caused by metal debris. Refer to **Drive Chain, Drive Sprocket, and Driven Sprocket Cleaning and Inspection** and **Front Output Shaft and Input Shaft Cleaning and Inspection**.

TRANSFER CASE WHINE OR RUMBLE NOISE

Cause	Correction
DEFINITION: A faulty internal transfer case component that causes a whine or rumbling	

noise in the transfer case. Review the **Symptoms - Transfer Case** and perform the necessary inspections.	
Faulty bearings	1. Inspect all of the bearings and journals. Refer to **Rear Output Shaft Cleaning and Inspection**, **Front Output Shaft and Input Shaft Cleaning and Inspection**, and **Drive Chain, Drive Sprocket, and Driven Sprocket Cleaning and Inspection**. 2. Replace any faulty bearings, and any components with faulty bearing journals. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

TRANSFER CASE GROWL OR GRINDING NOISE

Cause	Correction
DEFINITION: A faulty internal transfer case component that causes a growl or grinding noise in the transfer case while the vehicle is turning or in a four wheel drive mode. Review the **Symptoms - Transfer Case** and perform the necessary inspections.	
High/low planetary carrier assembly	1. Inspect the high/low planetary carrier assembly for the following conditions: • Chipped, bent, or deformed teeth • Planetary gear needle bearings worn • Planetary gear thrust washers cracked or missing • Seized or binding planetary gears Refer to **High/Low Planetary Carrier Cleaning and Inspection** . 2. Replace the high/low planetary carrier assembly if any of the above conditions exist. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
	1. Inspect the input shaft in the planetary carrier assembly for excessive thrust end play. 2. Inspect the input shaft teeth for the following conditions: • Damage • Worn or galled thrust surfaces • Excessive wear

Input shaft	• Chipped teeth • Metal embedded in the root of the teeth Refer to **Front Output Shaft and Input Shaft Cleaning and Inspection** . 3. Replace the input shaft if faulty. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
Thrust washers	1. Inspect for missing or damaged input shaft thrust washers. 2. Inspect the thrust washers for galling. 3. Replace the thrust washers if faulty and the mating component if damaged. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
High/low internal gear	1. Inspect the high/low internal gear teeth for the following conditions: • Damage • Chipped teeth • Excessive wear • Metal embedded in the root of the teeth Refer to **Transfer Case Front Half Cleaning and Inspection** . 2. Replace the front case half if the high/low internal gear is faulty. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

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	1. Inspect for a broken clutch apply plate. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

	2. Replace the apply plate and the transfer case components that are damaged from debris. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
Faulty control actuator lever thrust bearings	1. Inspect for faulty control actuator lever thrust bearings. Refer to **Two/Four Wheel Drive Shift Components Cleaning and Inspection**. 2. Recondition the transfer case components that are damaged from debris. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

TRANSFER CASE CLUNK IN 2HI ONLY

Cause	Correction
DEFINITION: During acceleration or deceleration, a clunk is heard or felt in the transfer case while in the 2HI mode. Review the **Symptoms - Transfer Case** and perform the necessary inspections.	
Incorrect fluid level or incorrect fluid	1. Inspect the transfer case for the correct fluid level. 2. Inspect the transfer case for the correct type of fluid. Refer to **Approximate Fluid Capacities** . 3. 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	1. Inspect for the following conditions: • Worn slip yoke splines • Worn rear output shaft splines 2. Repair or replace the following components if faulty: • Replace the slip yoke, if required. Refer to **One-Piece Propeller Shaft Replacement** and **Two-Piece Propeller Shaft Replacement** . • Replace the rear output shaft, if required. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble** .
Excessive clearance	1. Inspect for the following conditions: • Worn rear bushing • Worn slip yoke bushing journal 2. Repair or replace the following components if faulty:

between the slip yoke and the rear bushing	• Replace the slip yoke, if required. Refer to **One-Piece Propeller Shaft Replacement** and **Two-Piece Propeller Shaft Replacement** . • Replace the rear bushing if worn. Refer to **Transfer Case Rear Extension Bushing Replacement** .
Input shaft thrust washers	1. Inspect for worn or missing input shaft thrust washers. 2. Replace the thrust washers as required. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
Worn high speed teeth on the high/low clutch	1. Inspect for worn high speed teeth on the high/low clutch. Refer to **High/Low Shift Components Cleaning and Inspection**. 2. Replace the high/low clutch if worn. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
Rear output shaft rear bearing outer retaining ring	1. Inspect for the following conditions: • Properly installed rear output shaft rear bearing outer retaining ring • Excessive wear or damaged retaining ring groove in the rear case half 2. Repair or replace the following components if found faulty. • 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** and **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. 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**.
Input shaft thrust washers	1. Inspect for worn or missing input shaft thrust washers. 2. Replace the thrust washers as required. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
Rear output shaft rear bearing outer retaining ring	1. Inspect for the following conditions: • Properly installed rear output shaft rear bearing outer retaining ring • Excessive wear or damaged retaining ring groove in the rear case half 2. Repair or replace the following components if found faulty: • 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** and **Transfer Case Assemble** .
Worn high speed teeth on the high/low clutch	1. Inspect for worn high speed teeth on the high/low clutch. Refer to **High/Low Shift Components Cleaning and Inspection**. 2. Replace the high/low clutch if worn. Refer to **Transfer Case Disassemble** and **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. Review the **Symptoms - Transfer Case** and perform the necessary inspections.	
	1. Inspect for the following conditions: • Excessively worn planetary gears

High/low planetary carrier assembly	• The planetary gears loose in the planetary carrier • The input shaft for missing thrust washers or excessive thrust end play in the carrier • Excessively worn high/low clutch engagement teeth on the carrier Refer to **High/Low Planetary Carrier Cleaning and Inspection** . 2. Replace the high/low planetary if any of the above conditions are found. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
High/low internal gear	1. Inspect the high/low internal gear to front case fit for any looseness. 2. Replace the front case half if the high/low internal gear is loose. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
High/low clutch	1. Inspect the high/low clutch engagement teeth for excessive wear. 2. Inspect the high/low clutch to rear output shaft splines for excessive wear. 3. Replace the high/low clutch if faulty. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

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	1. Inspect the transfer case for the correct fluid level. 2. Inspect the transfer case for the correct type of fluid. Refer to **Approximate Fluid Capacities** . 3. Flush the transfer case and fill with the correct fluid, if required. Refer to **Transfer Case Fluid Replacement**.
	1. Inspect for the following conditions:

Excessive clearance between the slip yoke and the rear output shaft	• Worn slip yoke splines • Worn rear output shaft splines 2. Repair or replace the following components if faulty: • Replace the slip yoke, if required. Refer to **One-Piece Propeller Shaft Replacement** or **Two-Piece Propeller Shaft Replacement** . • Replace the rear output shaft, if required. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble** .
Excessive clearance between the slip yoke and the rear bushing	1. Inspect for the following conditions: • Worn rear bushing • Worn slip yoke bushing journal 2. Repair or replace the following components if faulty: • Replace the slip yoke, if required. Refer to **One-Piece Propeller Shaft Replacement** or **Two-Piece Propeller Shaft Replacement** . • Replace the rear bushing if worn. Refer to **Transfer Case Rear Extension Bushing Replacement** .

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	1. 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**. 2. De-burr the hub slots. If the hub slots are excessively notched, replace the clutch hub. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

TRANSFER CASE WILL NOT SHIFT

Cause	Correction
DEFINITION: While shifting from HI range to LO range, there is gear clashing or the gear range cannot be selected. Review the **Symptoms - Transfer Case** and perform the necessary inspections.	
High/low shift fork spring assembly	1. Inspect the high/low shift fork spring assembly for the following conditions: • Worn high/low shift fork pin • Worn cam • Broken spring Refer to **High/Low Shift Components Cleaning and Inspection** . 2. Replace the following components if found faulty: • The high/low shift fork spring assembly • The high/low shift fork pin Refer to **High/Low Shift Fork Replacement** .
High/low shift fork	1. Inspect the high/low shift fork for the following conditions: • Worn shift fork pads • Cracked or bent shift fork Refer to **High/Low Shift Components Cleaning and Inspection** . 2. Replace the following components if found faulty: • The shift fork pads • The shift fork Refer to **High/Low Shift Fork Replacement** .
	1. Inspect the high/low clutch for the following conditions: • Engagement teeth for burrs or damage • Sliding freely on the rear output shaft

High/low clutch	• The high/low clutch collar for excessive wear Refer to **High/Low Shift Components Cleaning and Inspection** . 2. Replace the high/low clutch if faulty. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
Input shaft pilot bearing assembly	1. Inspect for the following conditions: • Failed bearing in the input shaft • Journal on the rear output shaft for excessive wear or damage Refer to **Rear Output Shaft Cleaning and Inspection** and **Front Output Shaft and Input Shaft Cleaning and Inspection** . 2. Replace the bearing if faulty. Refer to **Input Shaft Pilot Bearing Replacement (Light Duty)** or **Input Shaft Pilot Bearing Replacement (Heavy Duty and Super Heavy Duty)** . 3. Replace the rear output shaft if damaged. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
High/low planetary carrier assembly	1. Inspect the high/low planetary engagement teeth for burrs or damage. Refer to **High/Low Planetary Carrier Cleaning and Inspection** . 2. Replace the high/low planetary carrier assembly if faulty. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

TRANSFER CASE JUMPS OUT OF GEAR

Cause	Correction
DEFINITION: Loss of the transfer case drive torque during deceleration, acceleration or under load. Review the **Symptoms - Transfer Case** and perform the necessary inspections.	
	1. Inspect the high/low shift fork pads for wear. Refer to

High/low shift fork pads	**High/Low Shift Components Cleaning and Inspection**. 2. Replace the fork pads if worn. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
Faulty high/low shift fork	1. Inspect the high/low shift fork for being damaged. Refer to **High/Low Shift Components Cleaning and Inspection**. 2. Replace the high/low shift fork if faulty. Refer to **High/Low Shift Fork Replacement**.
High/low shift fork spring assembly	1. Inspect the high/low shift fork spring assembly for the following conditions: • Worn high/low shift fork pin • Worn cam • Broken spring Refer to **High/Low Shift Components Cleaning and Inspection** . 2. Replace the following components if found faulty: • The high/low shift fork spring assembly • The high/low shift fork pin Refer to **High/Low Shift Fork Replacement** .
Faulty high speed teeth on the high/low clutch	1. Inspect for the following conditions: • The input shaft high speed engagement teeth for wear or damage • The engagement teeth on the high/low clutch for wear or damage Refer to **Front Output Shaft and Input Shaft Cleaning and Inspection** and **High/Low Shift Components Cleaning and Inspection** . 2. Replace the high/low clutch if the teeth are faulty. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

	3. Replace the input shaft if the engagement teeth are faulty. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
High/low planetary carrier assembly	1. Inspect the high/low planetary carrier for the following conditions: • Low speed engagement teeth worn or damaged • Cracked carrier housing • Planetary gear needle bearings worn • Planetary gears broken or damaged teeth • Planetary gears seized or binding Refer to **High/Low Planetary Carrier Cleaning and Inspection** . 2. Replace the high/low planetary carrier if any of the above conditions exist. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
Input shaft pilot bearing assembly	1. Inspect the bearing in the input shaft and the rear output shaft journal for excessive wear. Refer to **Front Output Shaft and Input Shaft Cleaning and Inspection** and **Rear Output Shaft Cleaning and Inspection**. 2. Replace the bearing and the rear output shaft if faulty. Refer to **Input Shaft Pilot Bearing Replacement (Light Duty)** or **Input Shaft Pilot Bearing Replacement (Heavy Duty and Super Heavy Duty)** and **Transfer Case Assemble**.
Input shaft	1. Inspect the input shaft for broken or damaged teeth. Refer to **Front Output Shaft and Input Shaft Cleaning and Inspection**. 2. Replace the input shaft if faulty. Refer to **Transfer Case Disassemble** and **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.	
Drain plug or fill plug leak	1. Inspect for the correct sealer and amount of sealer on the plugs. Refer to **Sealers, Adhesives, and Lubricants**. 2. Correctly install the plugs. Refer to **Transfer Case Fluid Replacement**.
Access hole plugs leaking	Replace the access hole plugs or seal with room temperature vulcanizing (RTV) sealant.
Vehicle speed sensor (VSS) leaking	1. Remove the VSS. Refer to **Vehicle Speed Sensor Replacement**. 2. Inspect the VSS for the following conditions: • Cross threaded • Cut or damaged VSS O-ring seal • VSS over tightened causing deformation in the VSS 3. Replace the VSS O-ring seal if faulty. 4. Replace the VSS if faulty.
Rear output shaft seal leaking	1. Inspect for the following conditions: • Overfilled or improper transfer case fluid • Blocked vent • Seal improperly installed, worn, or damaged • Seal bore damaged or cracked • Rear output shaft bushing for excessive wear • Slip yoke seal surface for wear or pitting 2. Repair or replace the following components if found faulty: • Adjust or replace the transfer case fluid. Refer to **Transfer Case Fluid Replacement** . • Clean or properly route the vent hose. • Replace the rear output shaft seal. Refer to **Rear Output Shaft Seal Replacement** . • Replace the rear case half if the seal bore is damaged. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble** . • Replace the rear bushing if worn. Refer to **Transfer Case Rear Extension Bushing**

	Replacement . • Replace the slip yoke if the surface could cause leakage. Refer to **One-Piece Propeller Shaft Replacement** or **Two-Piece Propeller Shaft Replacement** .
Front output shaft seal leaking	1. Inspect for the following conditions: • Overfilled or improper transfer case fluid • Blocked vent • Seal improperly installed, worn or damaged • Seal bore damaged or cracked • Leaking cup plug in the front output shaft 2. Repair or replace the following components if found faulty: • Adjust or replace the transfer case fluid. Refer to **Transfer Case Fluid Replacement** . • Clean or properly route the vent hose. • Replace the front output shaft seal. Refer to **Front Output Shaft Seal Replacement** . • Replace the front case half if the seal bore is damaged. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble** . • Replace the cup plug in the front output shaft if it is leaking. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble** .
2/4 wheel drive actuator seal leaking	Replace the actuator seal. Refer to **Transfer Case Two/Four Wheel Drive Actuator Replacement**.
Leaking at the vent pipe	• Transfer case overfilled Inspect for the correct transfer case fluid level. Refer to **Transfer Case Fluid Replacement**. • Inspect for a damaged or missing vent pipe. Replace a damaged or missing vent and seal the vent pipe with the correct sealer. Refer to **Transfer Case Assemble**.

Transfer case to adapter leak	1. Inspect for the following conditions: • Loose mounting fasteners • Gasket faulty • The transfer case input shaft seal leaking • The pilot bearing in the input shaft leaking 2. Repair or replace the following components if found faulty: • Repair or replace the loose fasteners. Refer to **Transfer Case Adapter Replacement** . • Replace the transfer case adapter gasket. Refer to **Transfer Case Adapter Replacement** . • Replace the transfer case input shaft seal. Refer to **Input Shaft Seal Replacement** . • Inspect for the following conditions: ▪ Seal improperly installed, worn, or damaged ▪ Seal bore damaged or cracked ▪ Input shaft seal surface worn, grooved, or damaged • Replace the pilot bearing in the input shaft if it is leaking. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble** .
Case leaking	1. Inspect for the following conditions: • A cracked case • Case porosity 2. Replace the faulty case half. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
Front case half to rear case half seam leak	Disassemble and seal the case halves. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

REPAIR INSTRUCTIONS - ON VEHICLE

TRANSFER CASE SHIFT CONTROL SWITCH REPLACEMENT (WITHOUT SLT)

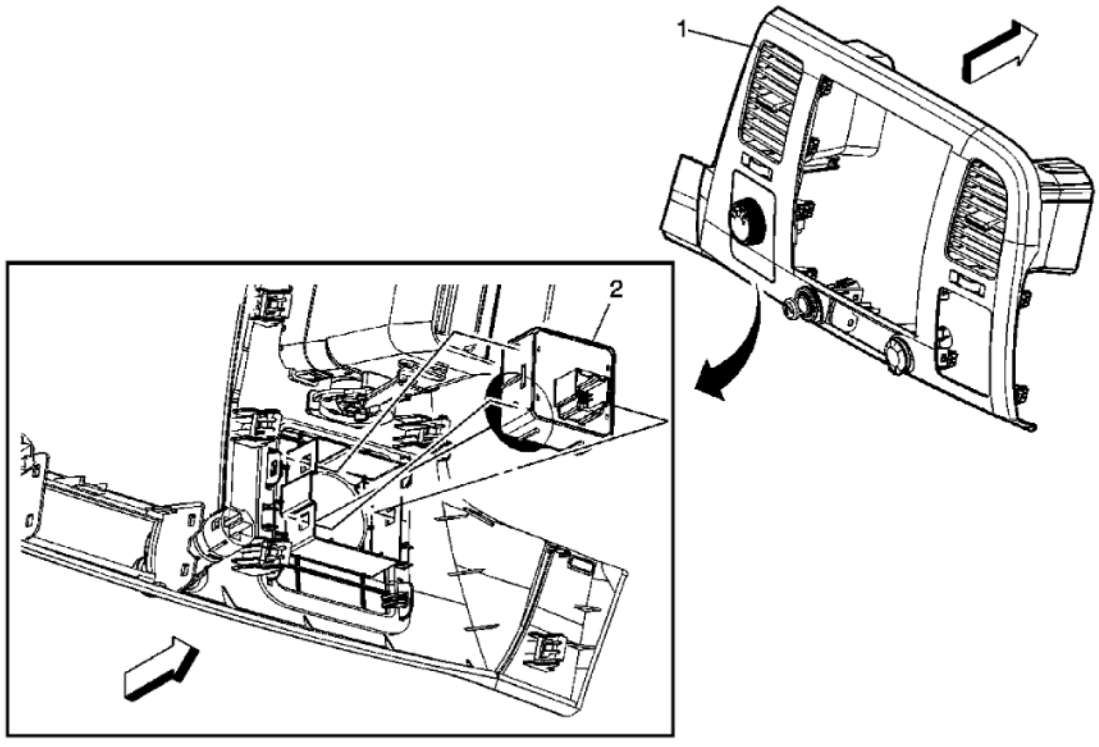


Fig. 7: Transfer Case Shift Control Switch Replacement (Without SLT)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Instrument Panel Accessory Trim Plate Refer to **Instrument Panel Accessory Trim Plate Replacement (without RPO SLT)** or **Instrument Panel Accessory Trim Plate Replacement (with RPO SLT)** .
2	Transfer Case Shift Control Switch **Procedure:** Disconnect the electrical connector.

TRANSFER CASE SHIFT CONTROL SWITCH REPLACEMENT (WITH SLT)

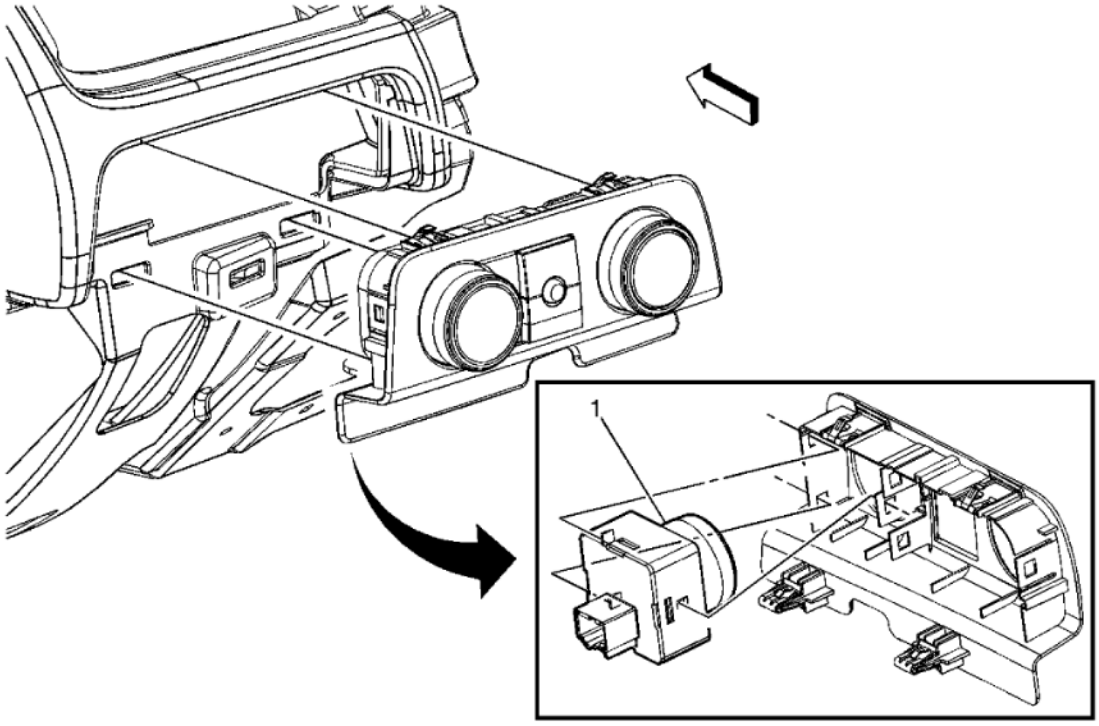


Fig. 8: Transfer Case Shift Control Switch Replacement (With SLT)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the headlight bezel. Refer to **Headlamp Switch Bezel Replacement (with RPO SLT)** .	
1	Transfer Case Control Switch **Tip:** • Disconnect the electrical connectors from the headlight and control switches. • It may be necessary to use a small flat bladed screw driver to depress the locking tabs to remove the control switch.

TRANSFER CASE SHIFT CONTROL MODULE REPLACEMENT

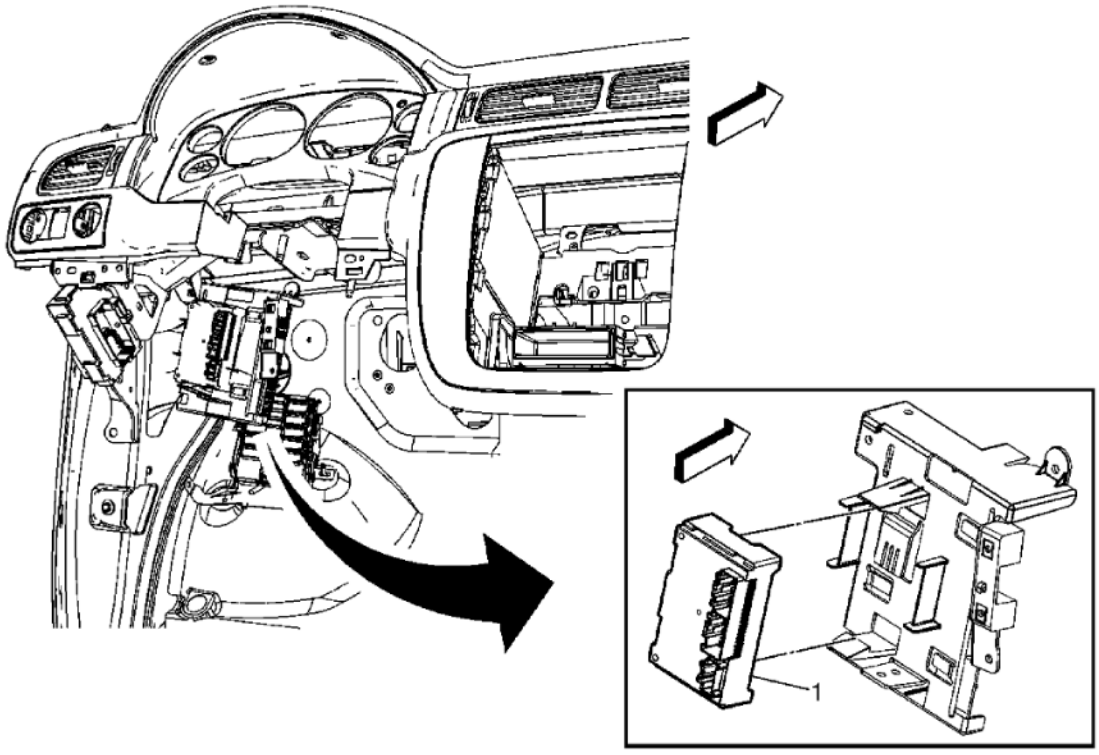


Fig. 9: Transfer Case Shift Control Module Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Transfer Case Shift Control Module **Procedure** 1. Disconnect the electrical connector. 2. Remove the module from the module bracket by releasing the retaining tabs.

TRANSFER CASE SHIELD REPLACEMENT

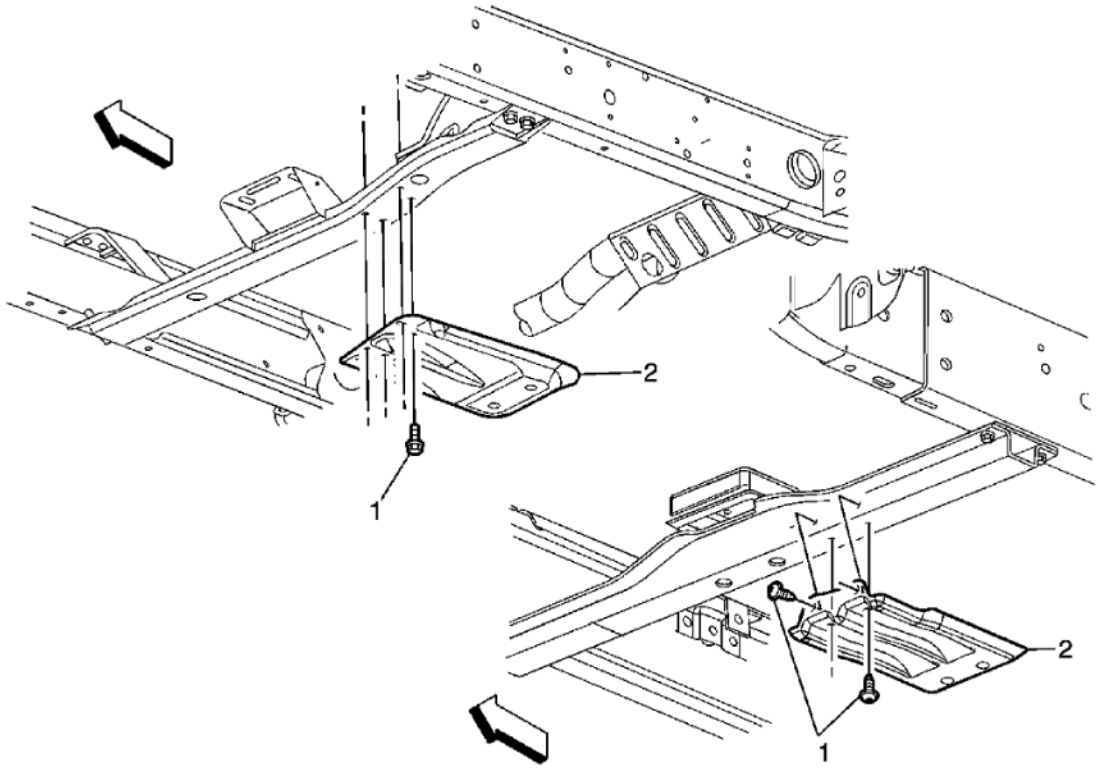


Fig. 10: Transfer Case Shield Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .	
1	Transfer Case Shield Bolt **NOTE:** **Refer to Fastener Notice .** **Tighten:** 20 N.m (15 lb ft)
2	Transfer Case Shield

TRANSFER CASE FLUID REPLACEMENT

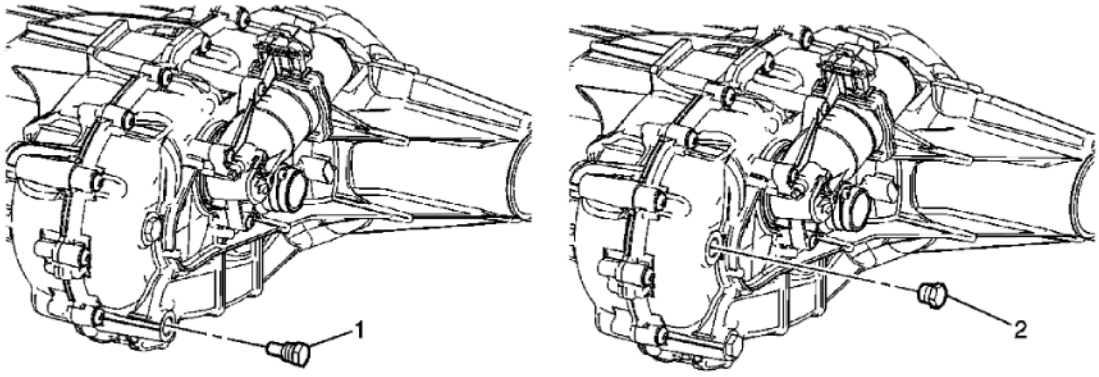


Fig. 11: Transfer Case Fluid Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement** .	
1	Transfer Case Drain Plug **NOTE:** **Refer to Component Fastener Tightening Notice .** **Procedure** 1. Allow the transfer case to drain completely. 2. Apply sealant GM P/N 12346004, (Canadian P/N 10953480), or equivalent, to the plug threads. **Tip:** Use only hand tools to remove and install the drain plug. **Tighten:** 18 N.m (13 lb ft)
	Transfer Case Fill Plug **Procedure** 1. Fill the transfer case to the bottom of the fill plug hole with DEXRON®

2	VI GM P/N 88861003 (Canadian P/N 88861004). 2. Apply sealant GM P/N 12346004, (Canadian P/N 10953480), or equivalent, to the plug threads. **Tip:** Use only hand tools to remove and install the fill plug. **Tighten:** 18 N.m (13 lb ft)

TRANSFER CASE TWO/FOUR WHEEL DRIVE ACTUATOR POSITION SENSOR REPLA REPLACEMENT

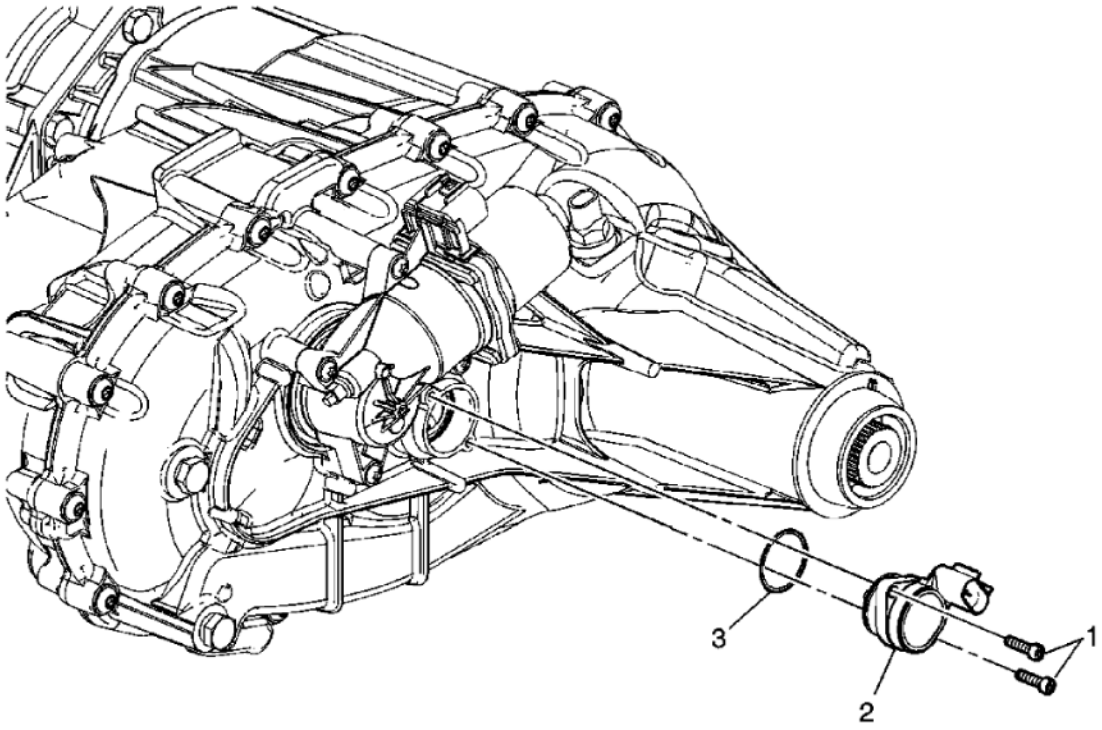


Fig. 12: Transfer Case Two/Four Wheel Drive Actuator Position Sensor Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .	
	Two/Four Wheel Drive Actuator Position Sensor Bolt (Qty: 2) **NOTE:**

1	**Refer to Fastener Notice .** **Tighten:** 9 N.m (80 lb in)
2	Two/Four Wheel Drive Actuator Position Sensor
3	Two/Four Wheel Drive Actuator Position Sensor O-ring Seal **Procedure:** Lightly lubricate the O-ring with clean DEXRON® VI.

TRANSFER CASE TWO/FOUR WHEEL DRIVE ACTUATOR REPLACEMENT

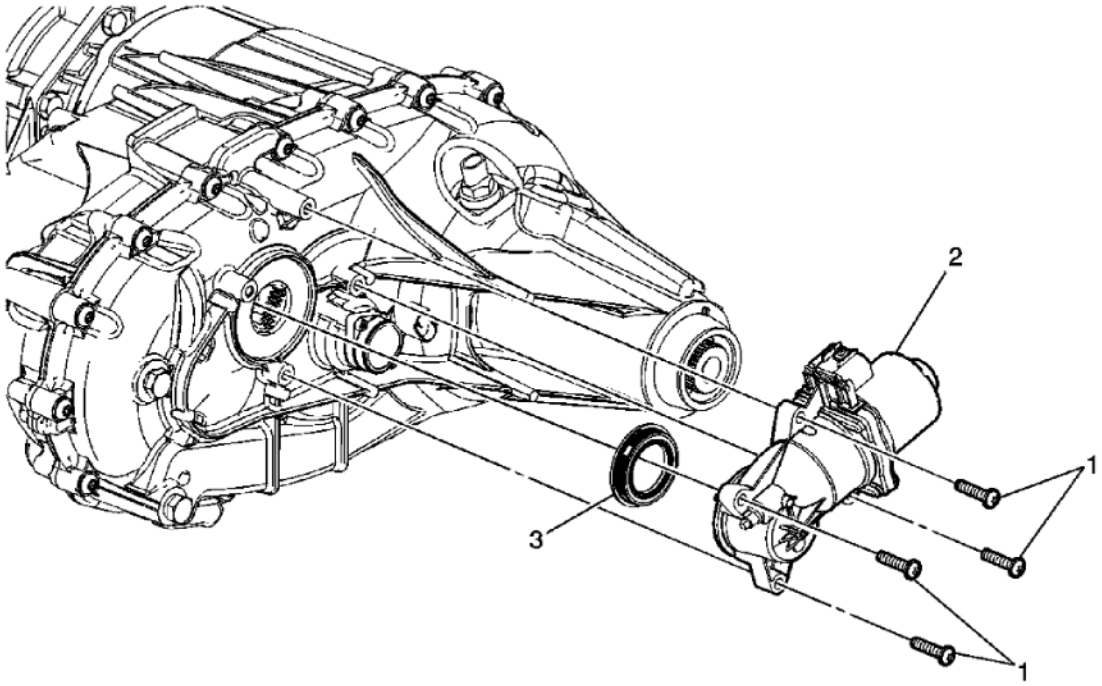


Fig. 13: Transfer Case Two/Four Wheel Drive Actuator Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .	
1	Two/Four Wheel Drive Actuator Bolts (Qty: 4) **NOTE:** **Refer to Fastener Notice .**

	Tighten: 18 N.m (13 lb ft)
2	Two/Four Wheel Drive Actuator
3	Two/Four Wheel Drive Actuator Seal **Procedure** 1. Use **J 45278** and **J 23907** to remove the seal from the actuator. See **Special Tools**. 2. Use the **J 44907** to install the seal to the actuator. See **Special Tools**. **Tip:** Remove the seal from the actuator ONLY if seal replacement is necessary. **Special Tools** • **J 23907** Slide Hammer • **J 44907** Bearing Installer. See **Special Tools**. • **J 45278** Seal Remover. See **Special Tools**.

VEHICLE SPEED SENSOR REPLACEMENT

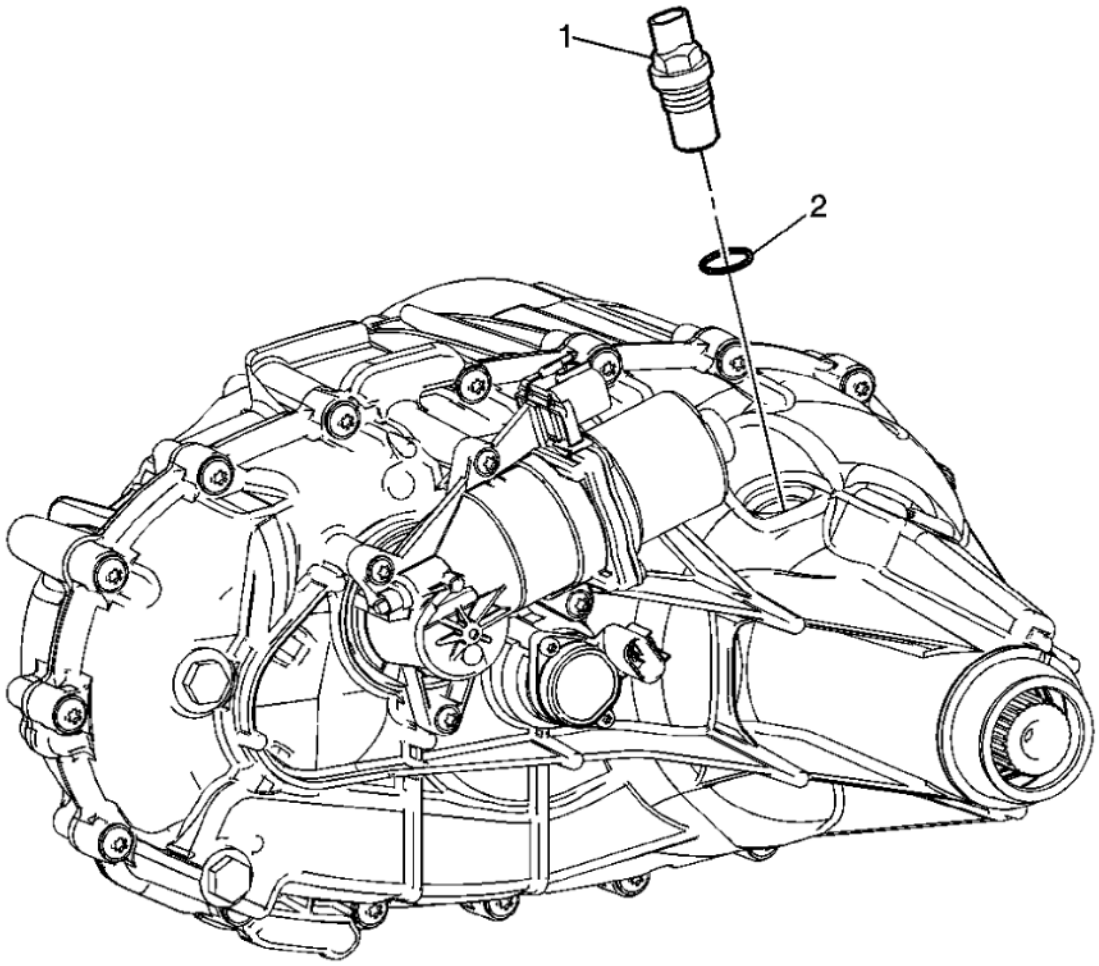


Fig. 14: Vehicle Speed Sensor Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement** .	
1	Vehicle Speed Sensor **NOTE:** **Refer to Component Fastener Tightening Notice .**

	Procedure: Disconnect vehicle speed sensor electrical connector. **Tighten:** 17 N.m (13 lb ft)
2	Vehicle Speed Sensor O-ring **Procedure:** Lightly lubricate the O-ring with clean DEXRON® VI.

FRONT OUTPUT SHAFT SEAL REPLACEMENT

2008 Chevrolet Silverado 1500

2008 TRANSMISSION Transfer Case - MP 3023/3024-NQH - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

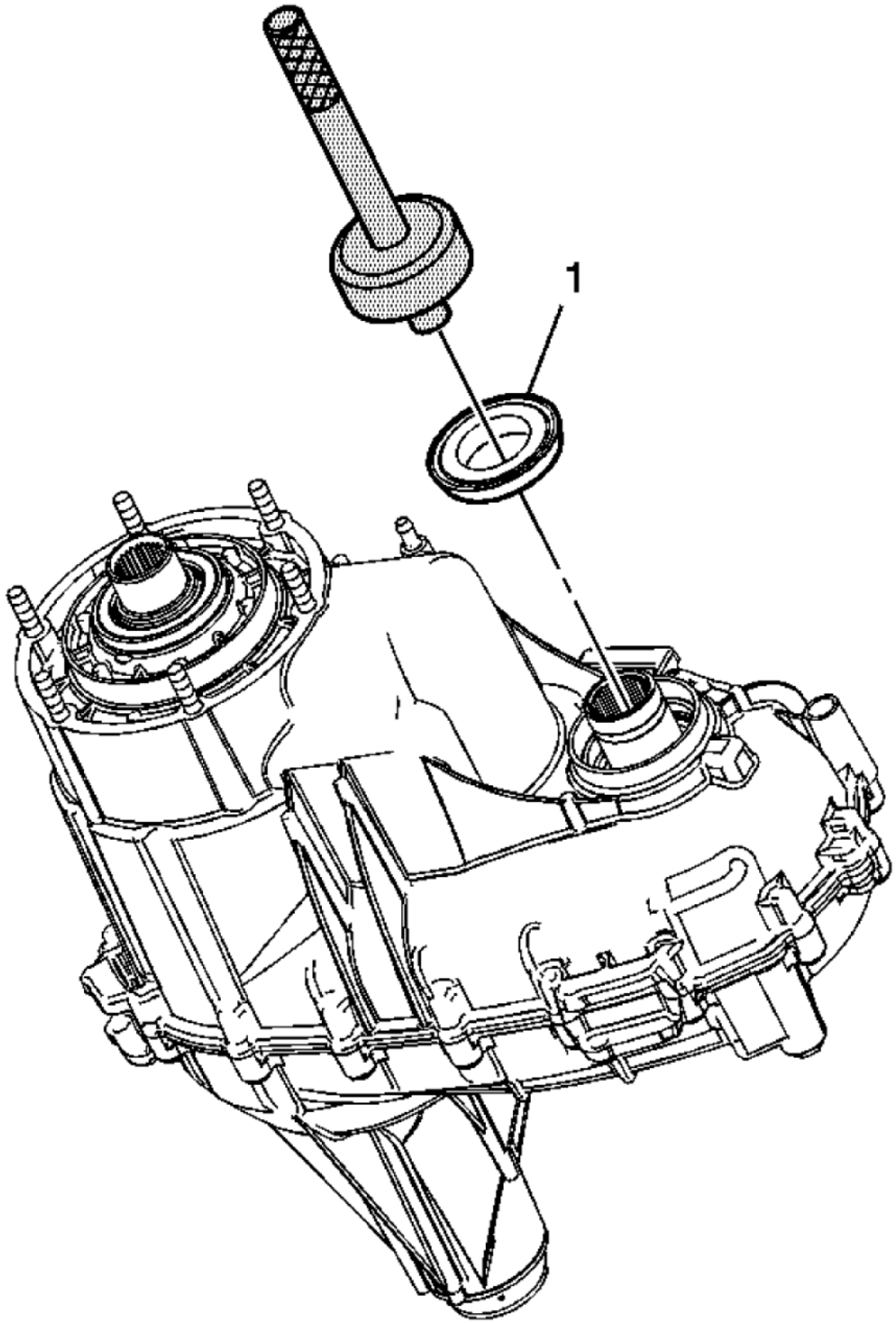


Fig. 15: Front Output Shaft Seal Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement** . 3. Remove the front propeller shaft. Refer to **Front Propeller Shaft Replacement** .	
1	Transfer Case Output Shaft Seal **Procedure:** 1. Remove the seal using a flat-bladed tool. 2. Install the seal using **J 8092** and **J 43484** . **Special Tools** • **J 8092** Driver Handle • **J 43484** Front Output Shaft Seal Installer

REAR OUTPUT SHAFT SEAL REPLACEMENT

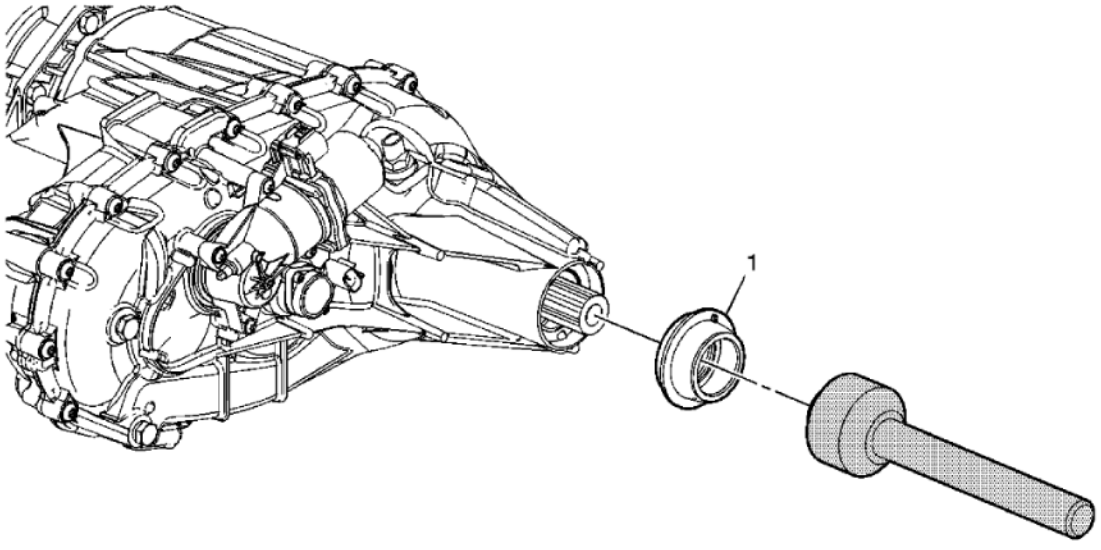


Fig. 16: Rear Output Shaft Seal Replacement

Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the rear propeller shaft. Refer to **One-Piece Propeller Shaft Replacement** or **Two-Piece Propeller Shaft Replacement** .	
1	Transfer Case Output Shaft Seal **Procedure** 1. Remove the seal using a flat-bladed tool. 2. Install the seal with the notch at the top and the weep hole at the bottom. **Tip:** Use the appropriate seal installer depending on application. **Special Tools** • **DT-48021** Seal Installer (Heavy Duty) • **DT-48210** Seal Installer (Light Duty) • **J 8092** Drive Handle

TRANSFER CASE REAR EXTENSION BUSHING REPLACEMENT

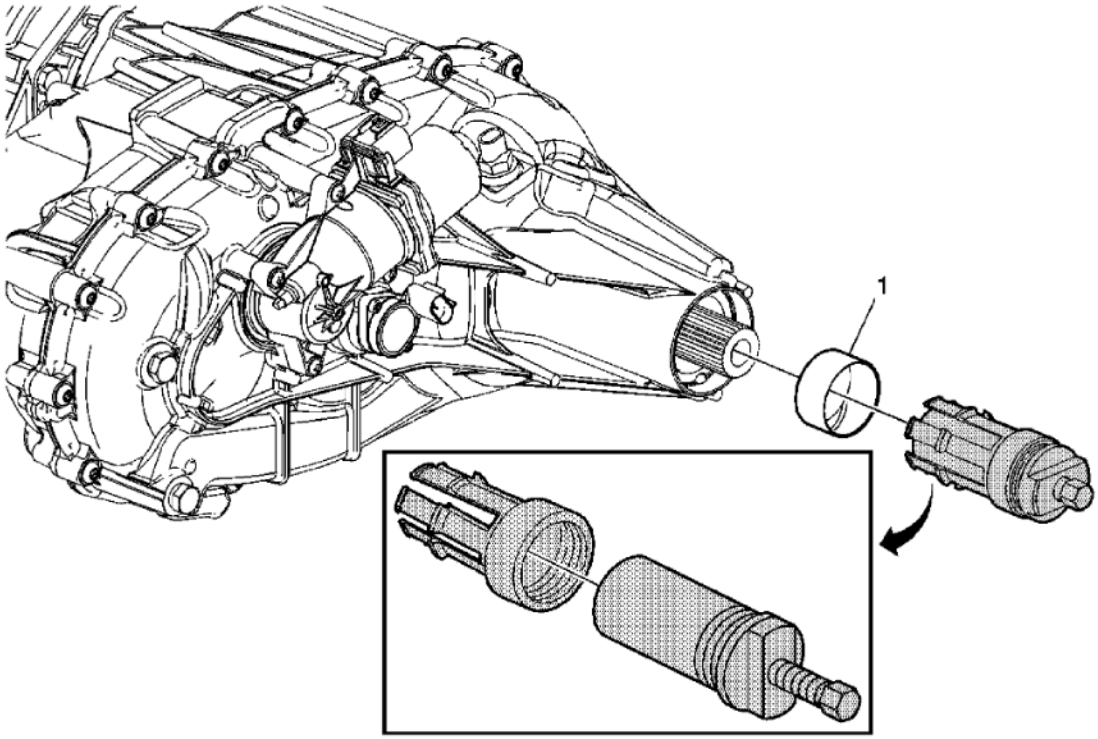


Fig. 17: Transfer Case Rear Extension Bushing Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the transfer case rear output shaft seal. Refer to **Rear Output Shaft Seal Replacement** **NOTE:** **Refer to Transfer Case Seal Removal Notice .**	
	Transfer Case Rear Output Shaft Bushing **Procedure** 1. Install the finger section of the **DT-48734** (Heavy Duty) or **J 45380** (Light Duty) in front of the bushing. 2. Install the forcing tube assembly into the finger section. Ensure the forcing screw is backed out. 3. Using a wrench on the forcing screw, remove the bushing. 4. Remove the old bushing from the **DT-48734** (Heavy Duty) or **J 45380**

1	(Light Duty). 5. Install the NEW bushing on the finger section of the **DT-48734** (Heavy Duty) or **J 45380** (Light Duty). 6. Install the finger section to the forcing tube assembly of the **DT-48734** (Heavy Duty) or **J 45380** (Light Duty). 7. Position the bushing and tool to the rear case half. 8. Install the bushing until the tool bottoms on the rear case half. **Tip:** • Use the appropiate bushing tool depending on application. • Only remove the bushing if faulty. • If the bushing was removed, a new bushing must be installed. • Ensure the bushing is installed squarely into the bushing bore. **Special Tools** • **DT-48734** Transfer Case Rear Bushing Remover and Installer (Heavy Duty) • **J 45380** Transfer Case Rear Bushing Remover and Installer (Light Duty)

TRANSFER CASE ASSEMBLY REPLACEMENT

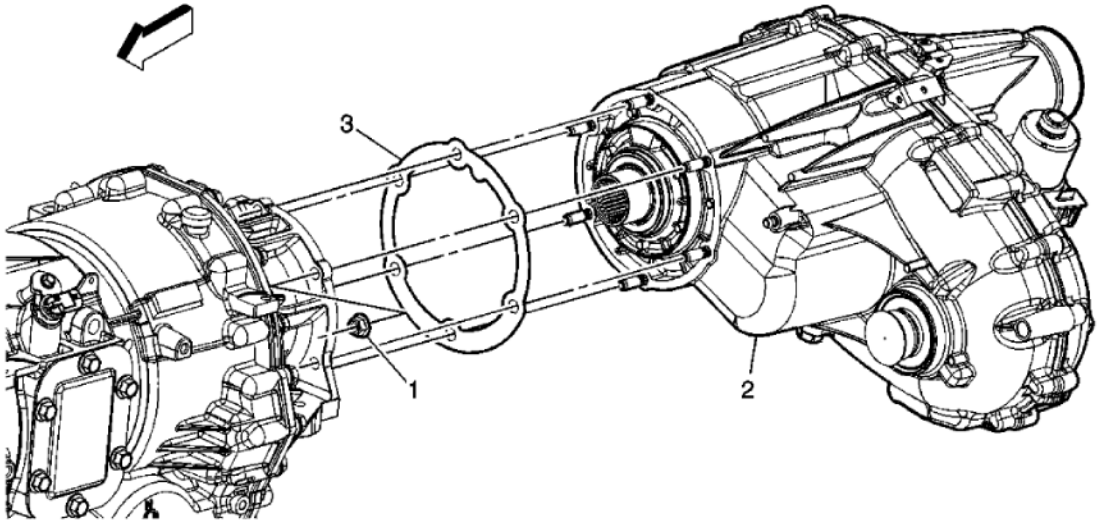


Fig. 18: Transfer Case Assembly Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement** . 3. Remove the rear propeller shaft. Refer to **One-Piece Propeller Shaft Replacement** or **Two-Piece Propeller Shaft Replacement** . 4. Remove the front propeller shaft. Refer to **Front Propeller Shaft Replacement** . 5. Drain the fluid from the transfer case. Refer to **Transfer Case Fluid Replacement**. 6. Disconnect the electrical connectors and remove the electrical harness from the transfer case. 7. Remove the crossmember. Refer to **Transmission Support Crossmember Replacement (2WD 2500 HD/3500)** or **Transmission Support Crossmember Replacement (2WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 2500 HD/3500)** . 8. Remove the transmission mount. Refer to **Transmission Mount Replacement (2WD)** or **Transmission Mount Replacement (4WD)** for the 4L60-E/4L65-E/4L70-E Transmission, or **Transmission Mount Replacement (2WD)** or **Transmission Mount Replacement (4WD)** for the 6L50/6L80/6L90 transmission.	
1	Transfer Case Nut **NOTE:** **Refer to Fastener Notice .** **Tighten:** 50 N.m (37 lb ft)
2	Transfer Case
3	Transfer Case Gasket **Tip:** Install a NEW gasket without the use of any type of sealant or lubricant.

TRANSFER CASE ADAPTER REPLACEMENT

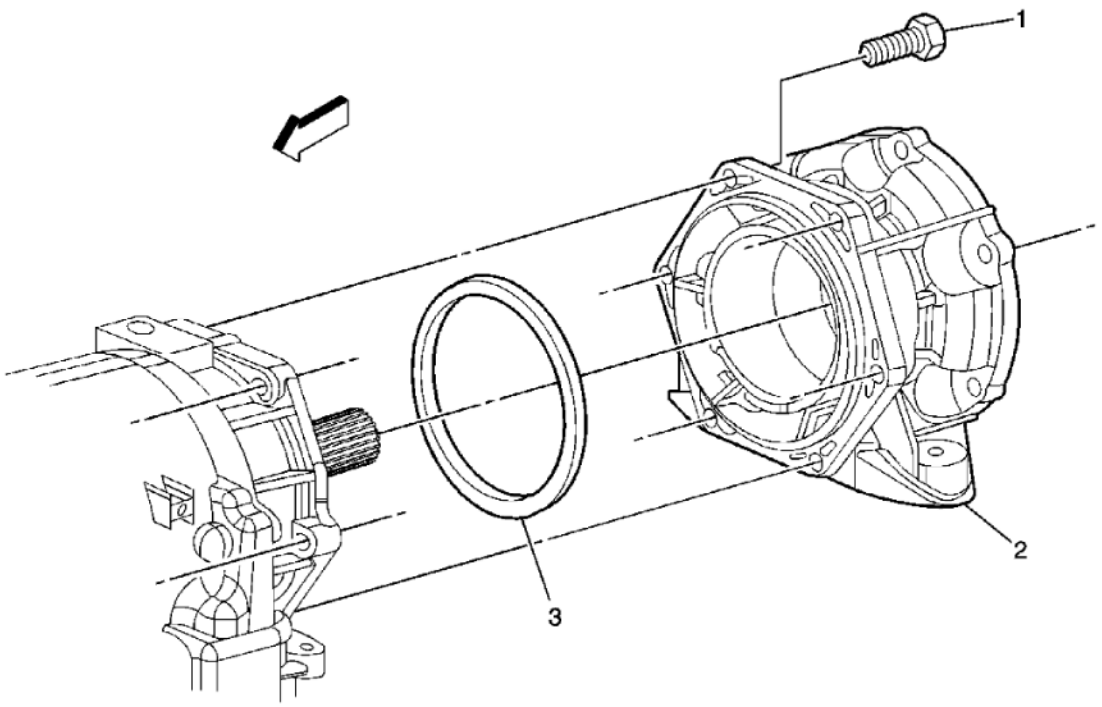


Fig. 19: Transfer Case Adapter Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Remove the transfer case. Refer to **Transfer Case Assembly Replacement**. 2. Remove the transmission mount. Refer to **Transmission Mount Replacement (2WD)** or **Transmission Mount Replacement (4WD)** for the 4L60-E/4L65-E/4L70-E transmission, or **Transmission Mount Replacement (2WD)** or **Transmission Mount Replacement (4WD)** for the 6L50/6L80/6L90 transmission.	
1	Transfer Case Adapter Bolt **NOTE:** Refer to **Fastener Notice** . **Tighten:** 50 N.m (37 lb ft)
2	Transfer Case Adapter
3	Transfer Case Adapter Seal **Tip:** Always use a new seal for the adapter. Do not use any type of sealant or adhesive in place of or with the seal.

INPUT SHAFT SEAL REPLACEMENT

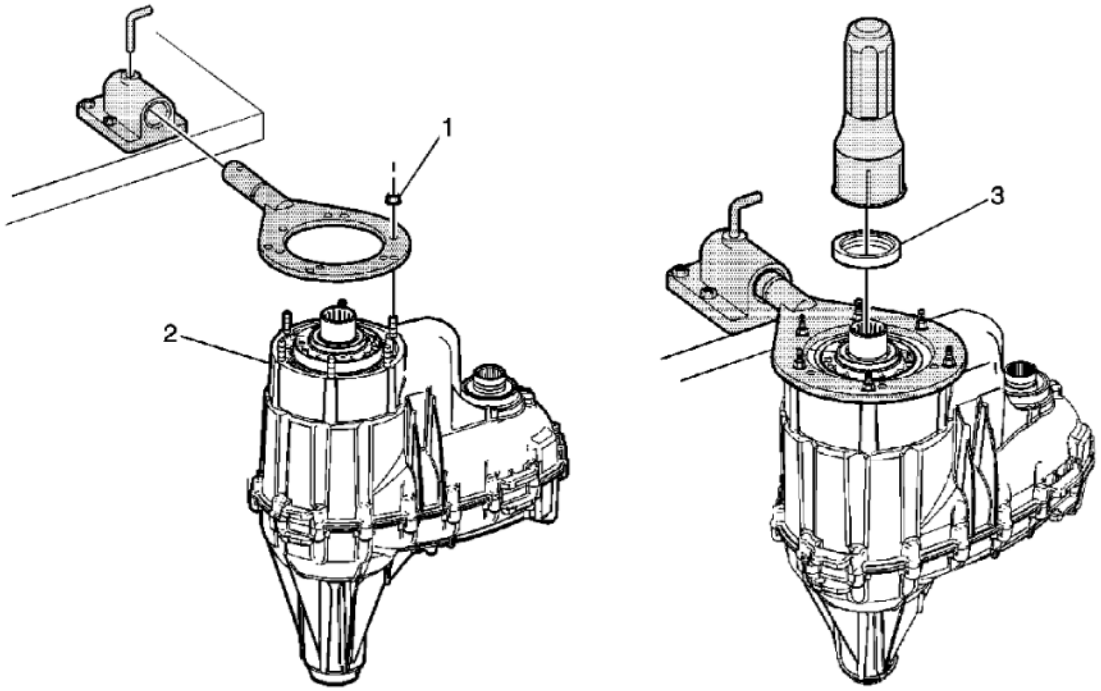


Fig. 20: Input Shaft Seal Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the transfer case. Refer to **Transfer Case Assembly Replacement**.	
1	Transfer Case Nut **Tip:** Use transfer case nuts to secure transfer case to assembly fixture **J 45759** . **Special Tools:** **J 45759** Assembly Fixture
2	Transfer Case **Tip:** Insert the transfer case and assembly fixture into the bench holding fixture **J 3289-20** and secure with pivot pin. **Special Tools:** **J 3289-20** Holding Fixture
	Transfer Case Input Shaft Seal **Procedure**

3	1. Remove the seal using a flat-bladed tool. 2. Install the seal using **J 42738** . **Special Tools:** **J 42738** Seal Installer

REPAIR INSTRUCTIONS - OFF VEHICLE

TRANSFER CASE DISASSEMBLE

Transfer Case Holding Fixture Installation

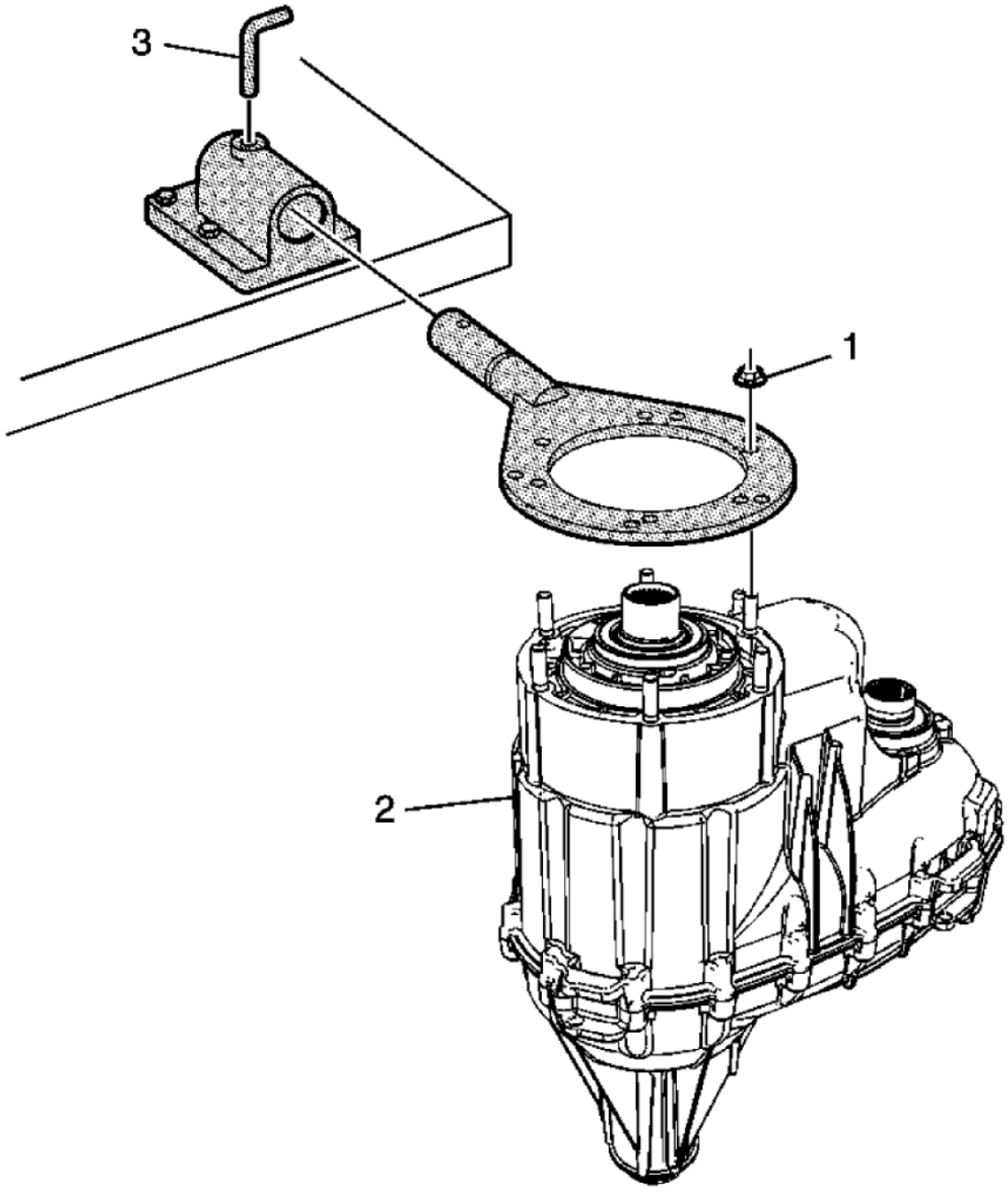


Fig. 21: Transfer Case Holding Fixture
Courtesy of GENERAL MOTORS CORP.

Transfer Case Holding Fixture Installation

Callout	Component Name
1	Transfer Case Nuts **Special Tools:**

	J 45759 Assembly Fixture
2	Transfer Case **Special Tools:** **J 3289-20** Holding Fixture
3	Pivot Pin **Tip:** • Always secure with the pivot pin after rotating. • The transfer case can be rotated 360 degrees to facilitate repair.

Access Hole Plugs, Fill and Drain Plug, Vent, 2/4 Wheel Drive Actuator, Actuator Shaft Position Sensor, and Vehicle Vehicle Speed Sensor Removal

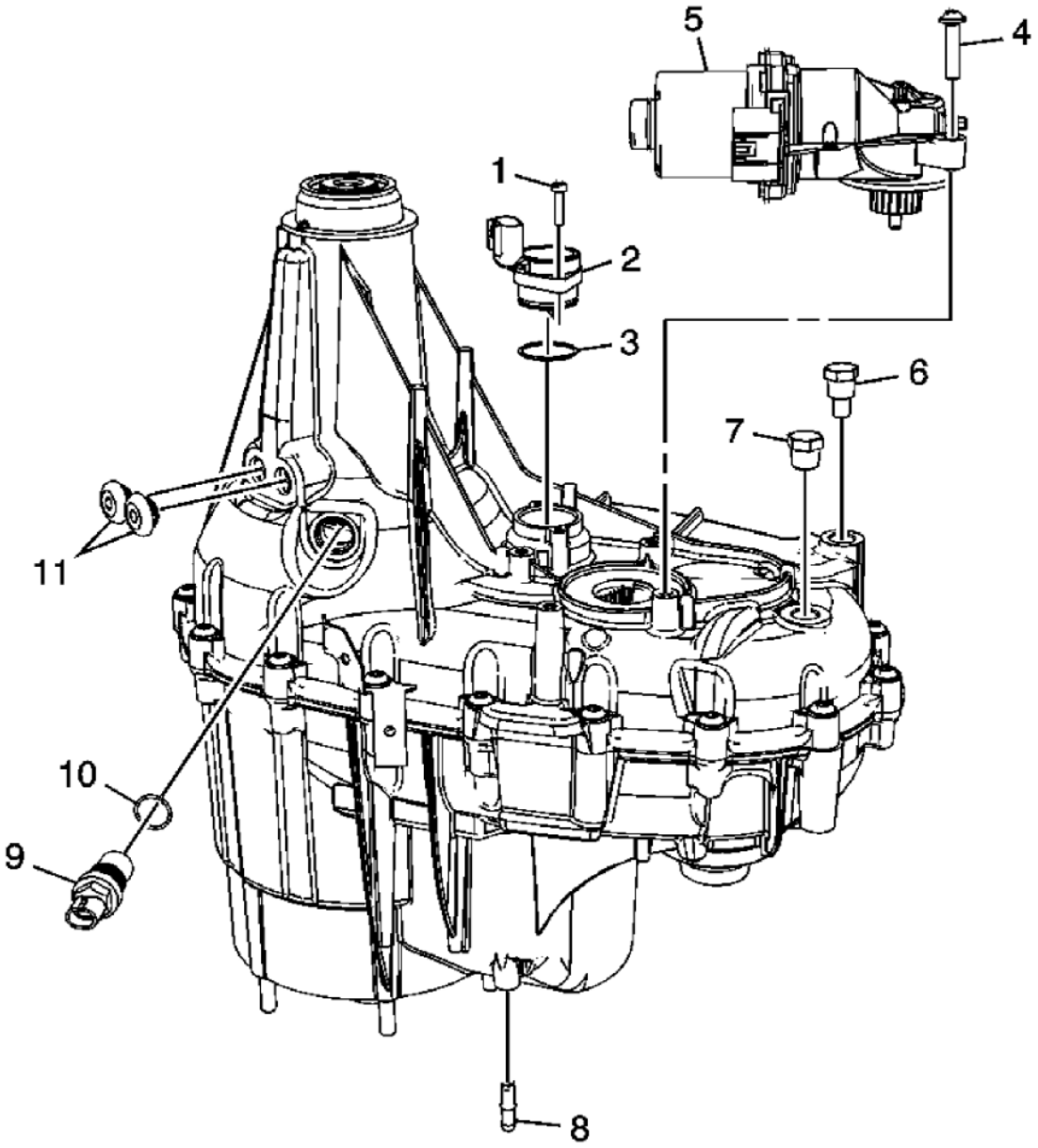


Fig. 22: View Of Transfer Case Components
Courtesy of GENERAL MOTORS CORP.

Access Hole Plugs, Fill and Drain Plug, Vent, 2/4 Wheel Drive Actuator, Actuator Shaft Position Sensor, and Vehicle Speed Sensor Removal

Callout	Component Name
1	Transfer Case Actuator Shaft Position Sensor Bolt/Screw
	Transfer Case Actuator Shaft Position Sensor

2	Assembly
3	Transfer Case Actuator Shaft Position Sensor O-Ring Seal
4	Transfer Case Two/Four Wheel Drive Actuator Bolt/Screw
5	Transfer Case Two/Four Wheel Drive Actuator Assembly
6	Transfer Case Oil Drain Plug
7	Transfer Case Oil Fill Plug
8	Transfer Case Vent **Tip:** Remove ONLY if the vent pipe is damaged.
9	Vehicle Speed Sensor Assembly
10	Vehicle Speed Sensor O-Ring Seal
11	Transfer Case Access Hole Plugs (Qty: 2)

Rear Output Shaft Seal and Bushing Removal

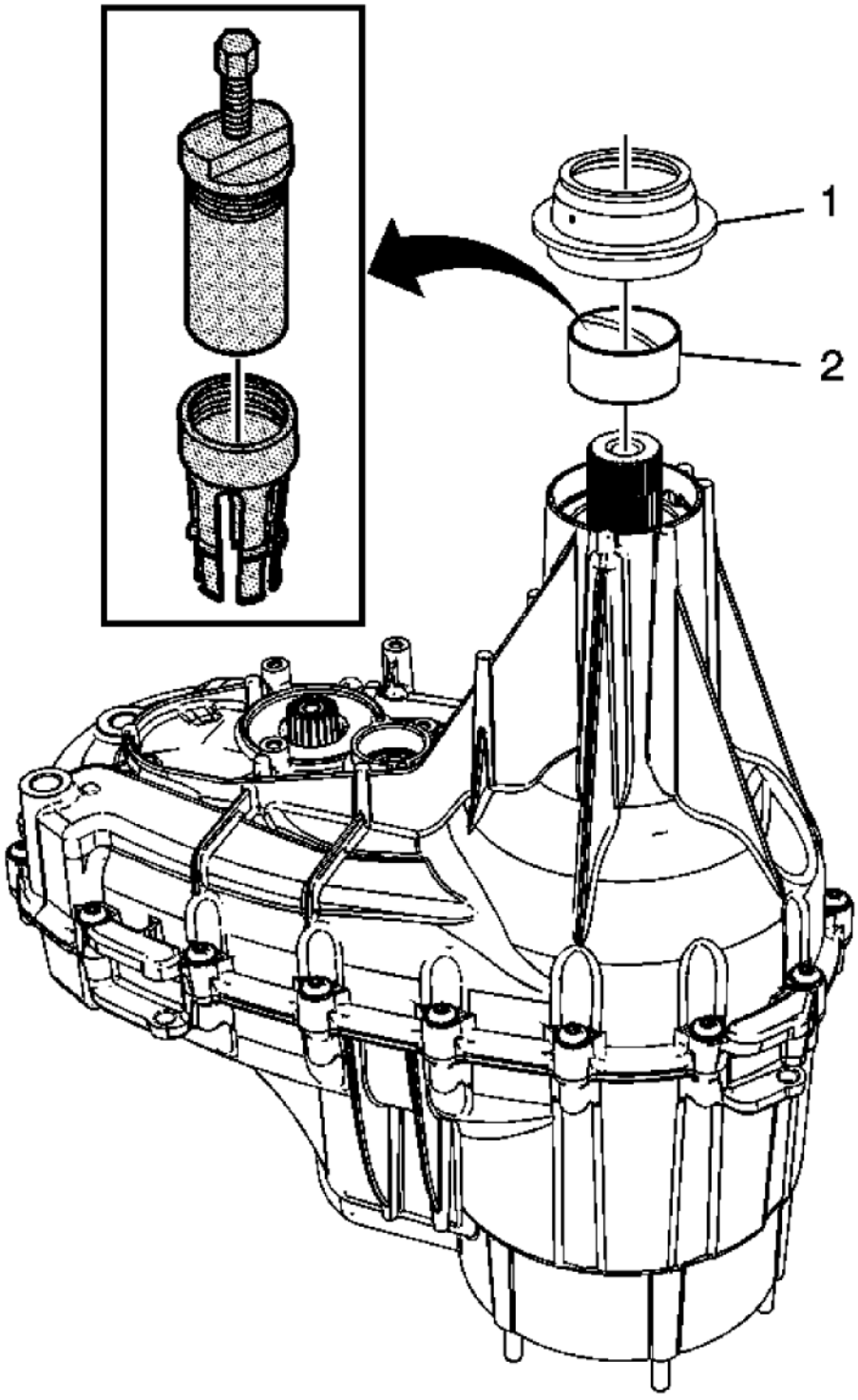


Fig. 23: View Of Transfer Case Rear Output Shaft Seal & Bushing
Courtesy of GENERAL MOTORS CORP.

Rear Output Shaft Seal and Bushing Removal

Callout	Component Name
1	Transfer Case Rear Output Shaft Seal **NOTE:** **Refer to Transfer Case Seal Removal Notice .**
2	Transfer Case Rear Output Shaft Bushing **Tip:** • Only remove the bushing if faulty. Refer to **Transfer Case Rear Half Cleaning and Inspection**. • Follow the steps below for use of the **J 45380** . 1. Install the finger section of the **J 45380** in front of the 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. **Special Tools:** **J 45380** Transfer Case Rear Bushing Remover and Installer

Transfer Case Rear Case Half Removal

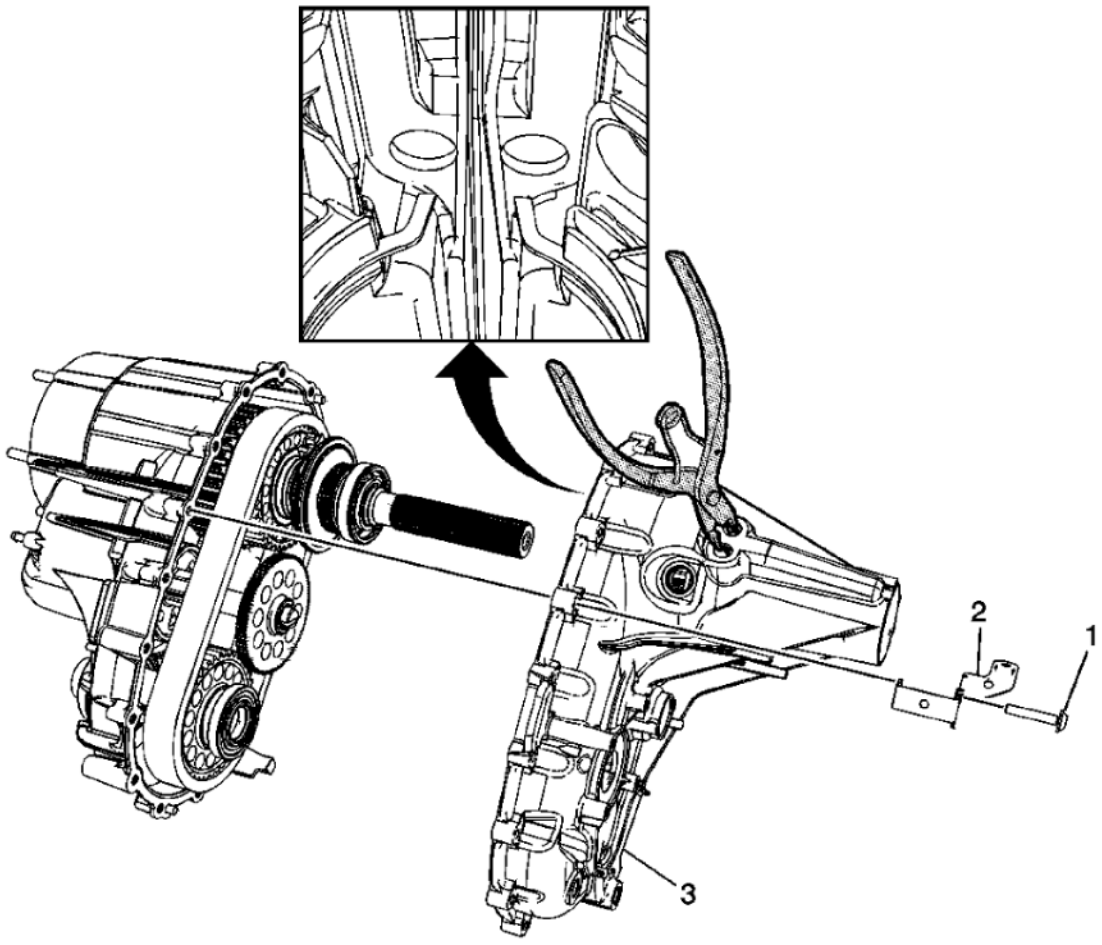


Fig. 24: View Of Transfer Case Halves, Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

Transfer Case Rear Case Half Removal

Callout	Component Name
1	Transfer Case Bolts (Qty: 17)
2	Transfer Case Bracket
3	Transfer Case Rear Case Half **NOTE:** **Refer to Machined Surface Damage Notice .** **Tip:**

	• Use opposing pry bars at casting bosses to spread the case. • 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.

Oil Pump Suction Pipe and Actuator Shaft Gear Removal

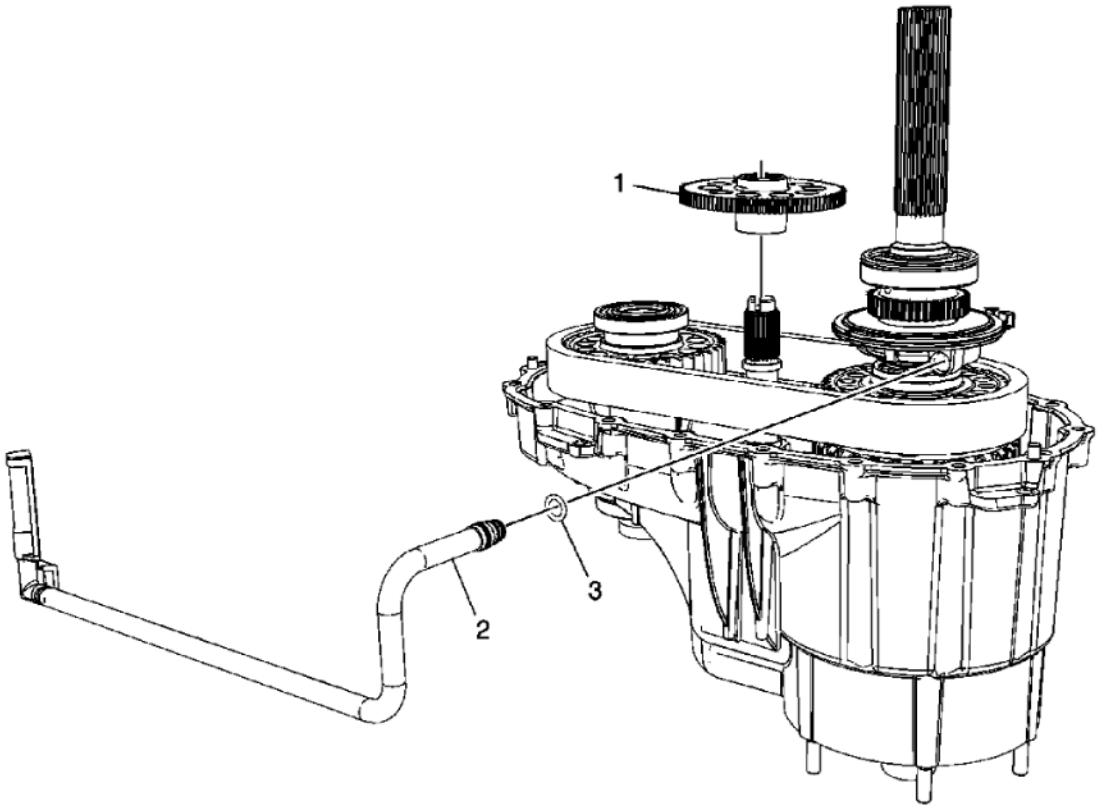


Fig. 25: View Of Oil Pump Suction Pipe, Seal & Actuator Shaft Gear
Courtesy of GENERAL MOTORS CORP.

Oil Pump Suction Pipe and Actuator Shaft Gear Removal

Callout	Component Name
1	Transfer Case Actuator Shaft Gear
2	Transfer Case Oil Pump Suction Pipe
3	Transfer Case Oil Pump Suction Pipe Seal

Shift Fork Assembly, Drive Chain, and Rear Output Shaft Assembly Removal

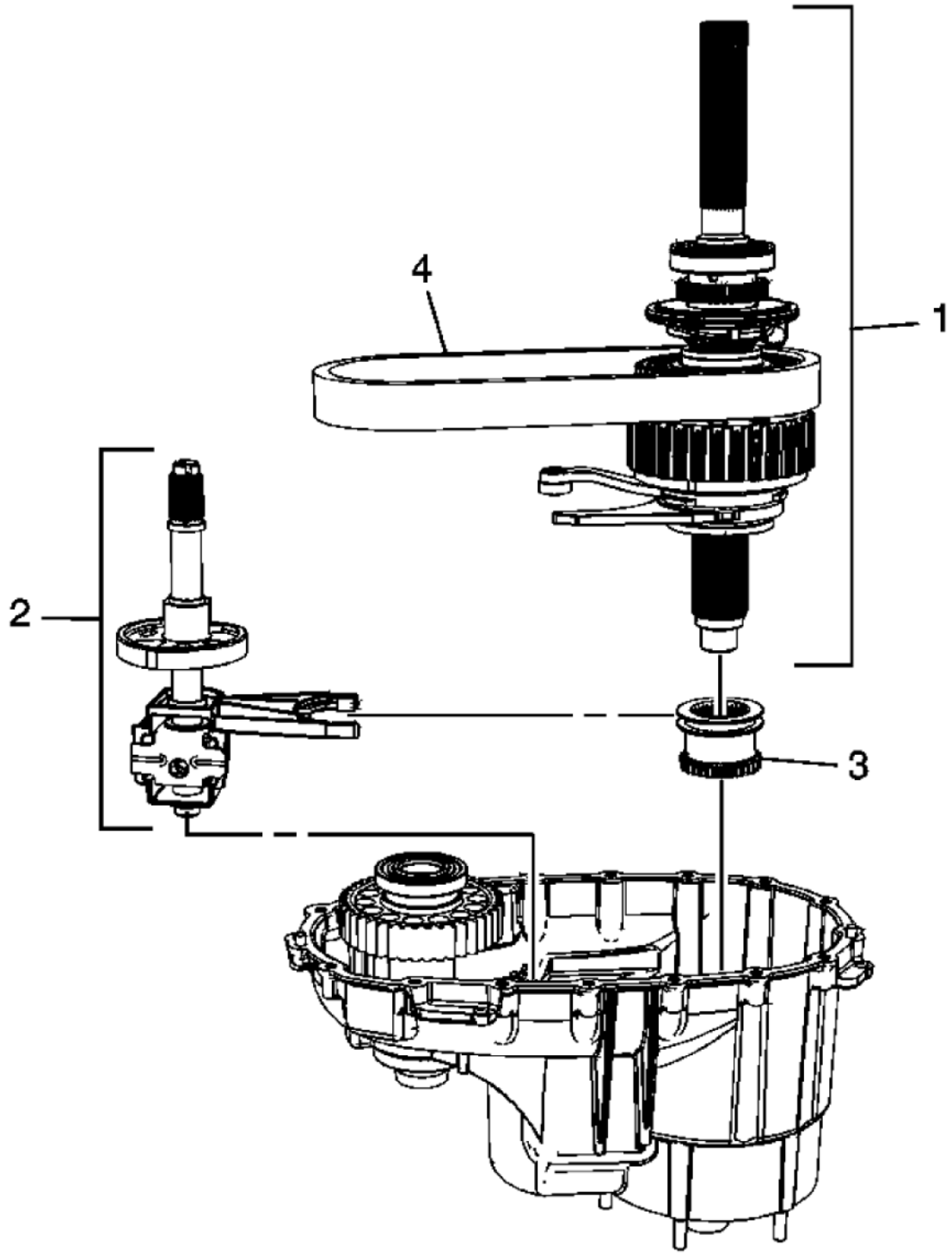


Fig. 26: View Of Shift Fork Assembly, Drive Chain, & Rear Output Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

Shift Fork Assembly, Drive Chain, and Rear Output Shaft Assembly Removal

Callout	Component Name
1	Transfer Case Rear Output Shaft Assembly **Tip:** Mount the assembly into a soft-jaw vice or holding fixture for disassembly.
2	Transfer Case High/Low Shift Fork Assembly
3	Transfer Case High/Low Clutch
4	Transfer Case Front Output Shaft Drive Chain Assembly

Rear Output Shaft Assembly Disassemble

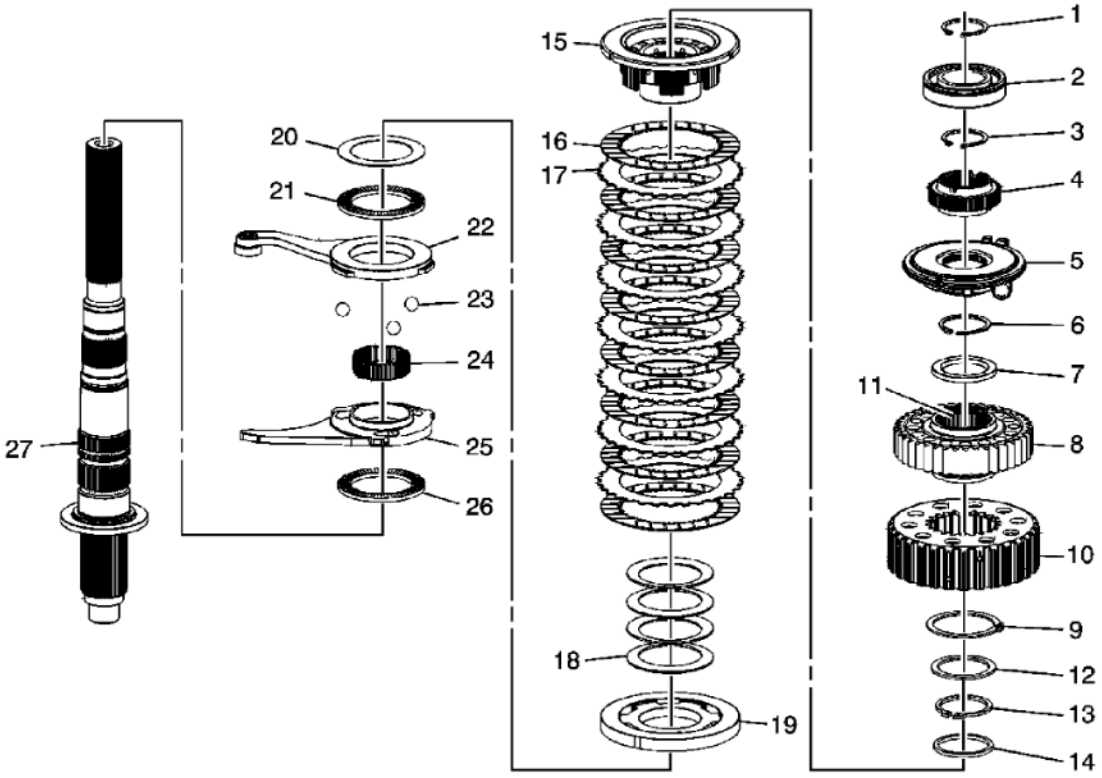


Fig. 27: View Of Rear Output Shaft Assembly Components
Courtesy of GENERAL MOTORS CORP.

Rear Output Shaft Assembly Disassemble

Callout	Component Name
1	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring

2	Transfer Case Rear Output Shaft Rear Bearing Assembly **Tip:** Use an arbor press or suitable puller to remove the bearing from the rear output shaft.
3	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
4	Transfer Case Rear Output Shaft Speed Reluctor Wheel
5	Transfer Case Oil Pump Assembly
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 Four Wheel Drive Clutch Housing Retaining Ring
10	Transfer Case Four Wheel Drive Clutch Housing
11	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly (Qty: 2) **Tip:** Only remove the bearing if faulty. Refer to **Drive Chain, Drive Sprocket, and Driven Sprocket Cleaning and Inspection**.
12	Transfer Case Front Output Shaft Drive 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 Pressure - Friction - Plate (Qty: 8)
17	Transfer Case Four Wheel Drive Clutch Pressure - Steel - Plate (Qty: 7)
18	Transfer Case Four Wheel Drive Clutch Pressure Plate Spring (Qty: 4)
19	Transfer Case Four Wheel Drive Clutch

	Pressure - Apply - Plate
20	Transfer Case Control Actuator Lever Washer
21	Transfer Case Control Actuator Lever Thrust Bearing Assembly
22	Transfer Case Control Actuator Lever Assembly
23	Transfer Case Control Actuator Lever Ball (Qty: 3)
24	Transfer Case Control Actuator Lever Bearing Assembly
25	Transfer Case Control Lever
26	Transfer Case Control Actuator Lever Thrust Bearing Assembly
27	Transfer Case Rear Output Shaft

Input Shaft and Planetary Assembly Removal

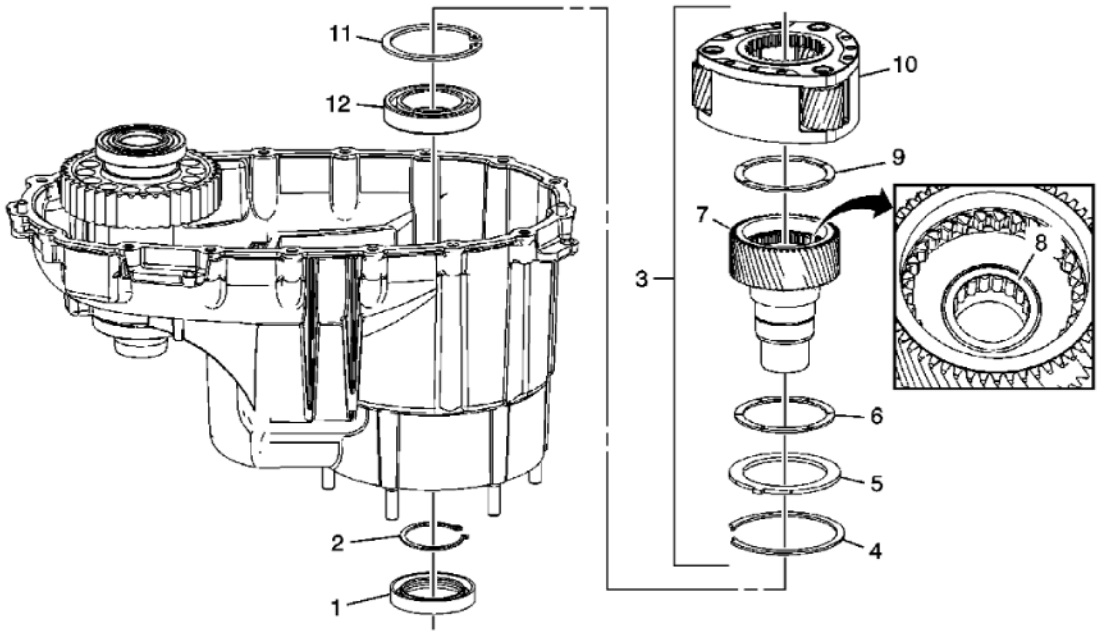


Fig. 28: View Of Input Shaft & Planetary Assembly Components
Courtesy of GENERAL MOTORS CORP.

Input Shaft and Planetary Assembly Removal

Callout	Component Name

1	Transfer Case Input Shaft Seal
2	Transfer Case Input Shaft Bearing Outer Retaining Ring **CAUTION:** **Do not rotate the transfer case while the retaining ring is removed. Rotating the transfer case while the retaining ring is removed, may cause the input shaft/planetary assembly to fall from the transfer case, resulting in personal injury.**
3	Transfer Case Input Shaft/Planetary Assembly
4	Transfer Case High/Low Planetary Carrier Retaining Ring
5	Transfer Case High/Low Locking Plate
6	Transfer Case Planetary Carrier Sun Gear Thrust Washer
7	Transfer Case Input Shaft
8	Transfer Case Input Shaft Pilot Bearing Assembly **Tip:** Only remove the bearing if faulty. Refer to **Front Output Shaft and Input Shaft Cleaning and Inspection**.
9	Transfer Case Planetary Carrier Sun Gear Thrust Washer
10	Transfer Case High/Low Planetary Carrier Assembly
11	Transfer Case Input Shaft Inner Retaining Ring
12	Transfer Case Input Shaft Bearing Assembly

Front Output Shaft Assembly Removal

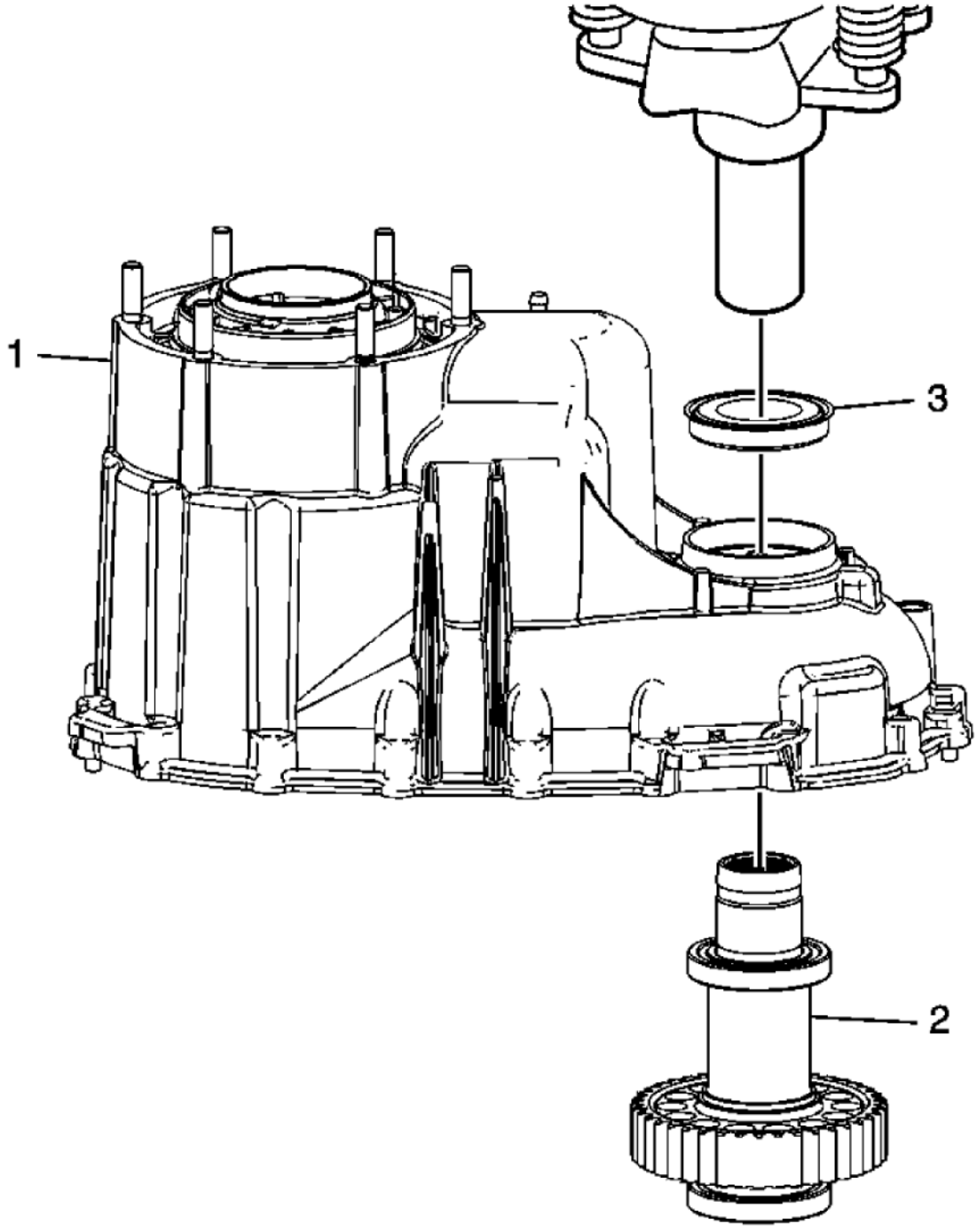


Fig. 29: View Of Transfer Case Front Half, Output Shaft Assembly & Seal
Courtesy of GENERAL MOTORS CORP.

Front Output Shaft Assembly Removal

Callout	Component Name

1	Transfer Case Front Case Half **Tip:** Place the front case half on an arbor press.
2	Transfer Case Front Output Shaft Assembly **Tip:** Press the front output shaft assembly from the front case half using an arbor press or soft-face hammer.
3	Transfer Case Front Output Shaft Seal

TRANSFER CASE FRONT HALF CLEANING AND INSPECTION

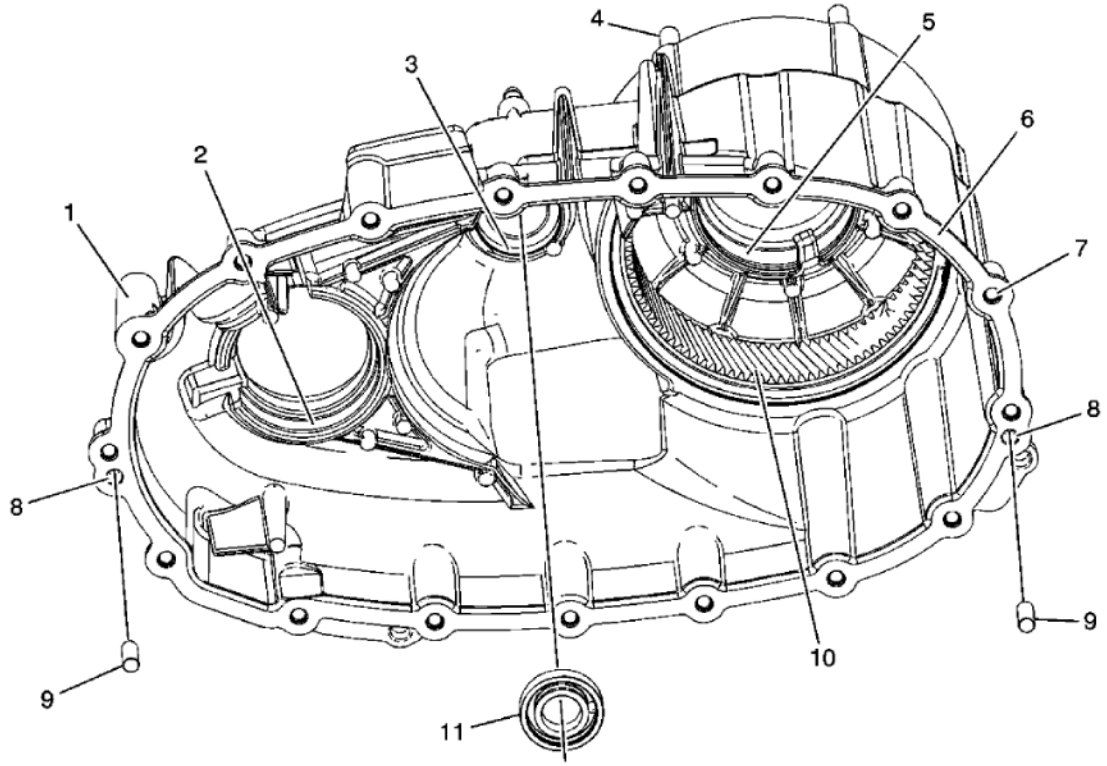


Fig. 30: Transfer Case Front Half Cleaning and Inspection
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
NOTE: Refer to Machined Surface Damage Notice . **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 the front case half in cleaning solvent and air dry.
- Remove any sealant from the sealing surface.

1	Transfer Case Front Half Assembly **Tip:** Inspect for cracks, broken areas, or other damage. The component must be replaced if damage is found.
2	Transfer Case Front Output Shaft Front Bearing Bore **Tip:** Replace the front case half assembly if a bearing has spun or if cracks are detected.
3	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Bore **Tip:** Replace the front case half assembly if a bearing has spun or if cracks are detected.
4	Transfer Case Studs (Qty: 6) **Tip:** Replace any damaged studs
5	Transfer Case Input Shaft Bearing Bore **Tip:** Replace the front case half assembly if a bearing has spun or if cracks are detected.
6	Case Sealing Surface **Tip:** Repair small scratches or nicks with a soft stone.
7	Transfer Case Thread Bolt Holes **Tip:** Repair any damaged threads.
8	Transfer Case Locating Pin Holes **Tip:** Replace the front case half assembly if the locating pin holes are out of round or damaged.
9	Transfer Case Locating pins (Qty: 2) **Tip:** Repair or replace loose, missing, or damaged locating pins.
10	Transfer Case High/Low Internal Gear **Tip:** 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 Assembly **Tip:** Replace the bearing if roughness, brinelling, or pitting is detected. Refer to **Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Replacement - Front**.

TRANSFER CASE REAR HALF CLEANING AND INSPECTION

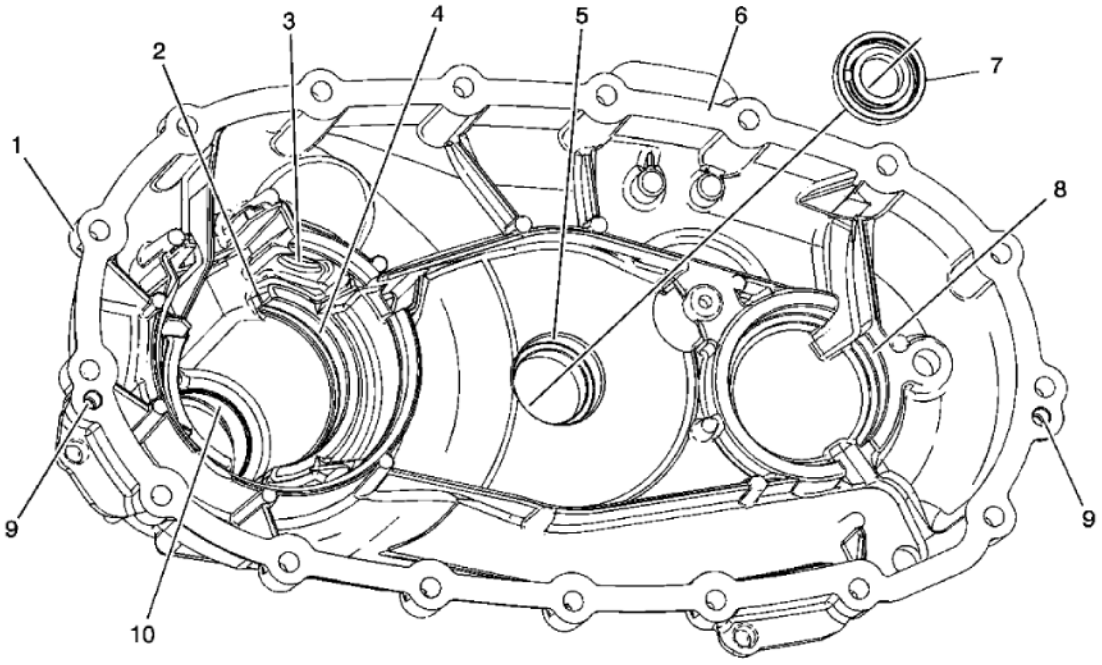


Fig. 31: Transfer Case Rear Half Cleaning and Inspection
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

NOTE:
Refer to Machined Surface Damage Notice .

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 the rear case half in cleaning solvent and air dry.

• Remove any sealant from the sealing surface.	
1	Transfer Case Rear Case Half Assembly **Tip:** Inspect for cracks, broken areas, or other damage. The component must be replaced if damage is found.
2	Transfer Case Rear Output Shaft Rear Bearing Outer Retaining Ring Groove **Tip:** Replace the rear case half assembly if the groove is worn.
3	Vehicle Speed Sensor Threads **Tip:** Replace the rear case half assembly if the speed sensor threads are damaged.
4	Transfer Case Rear Output Shaft Rear Bearing Bore **Tip:** Replace the rear case half assembly if a bearing has spun or if cracks are detected.
5	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Bore **Tip:** Replace the front case half assembly if a bearing has spun or if cracks are detected.
6	Case Sealing Surface **Tip:** Repair small scratches or nicks with a soft stone.
7	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Assembly **Tip:** Replace the bearing if roughness, brinelling, or pitting is detected. Refer to **Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Replacement - Rear**.
8	Transfer Case Front Output Shaft Rear Bearing Bore **Tip:** Replace the rear case half assembly if a bearing has spun or if cracks are detected.
9	Transfer Case Locating Pin Holes **Tip:** Replace the rear case half assembly if the locating pin holes are out of round or damaged.
10	Transfer Case Rear Output Shaft Bushing **Tip:** • Replace the bushing if it is damaged or worn. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.

	• If the bushing is removed, inspect the bushing bore for signs of spinning. Replace the rear case half assembly if the bushing has spun.

OIL PUMP CLEANING AND INSPECTION

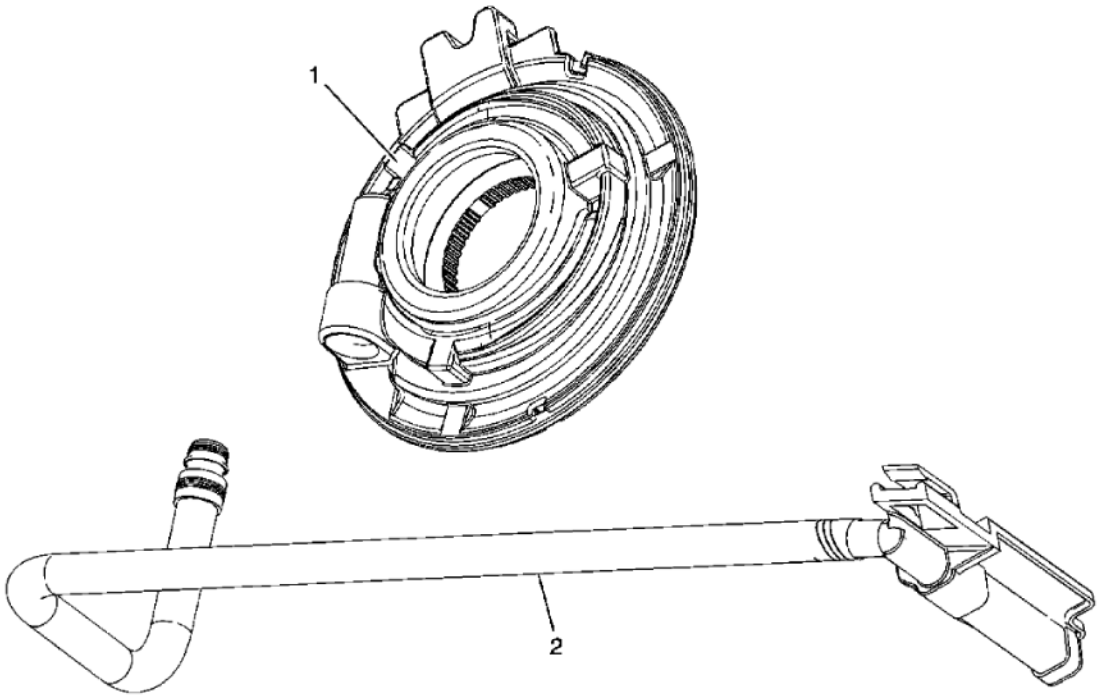


Fig. 32: Oil Pump Cleaning and Inspection
Courtesy of GENERAL MOTORS CORP.

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 Assembly **Tip:** Replace the oil pump assembly if end play is evident, or if there is any sign of binding. Do not disassemble the oil pump. The oil pump is serviced as an assembly.

2	Transfer Case Oil Pump Suction Pipe **Tip:** Replace the oil pump suction pipe if the screen is embedded with debris.

REAR OUTPUT SHAFT CLEANING AND INSPECTION

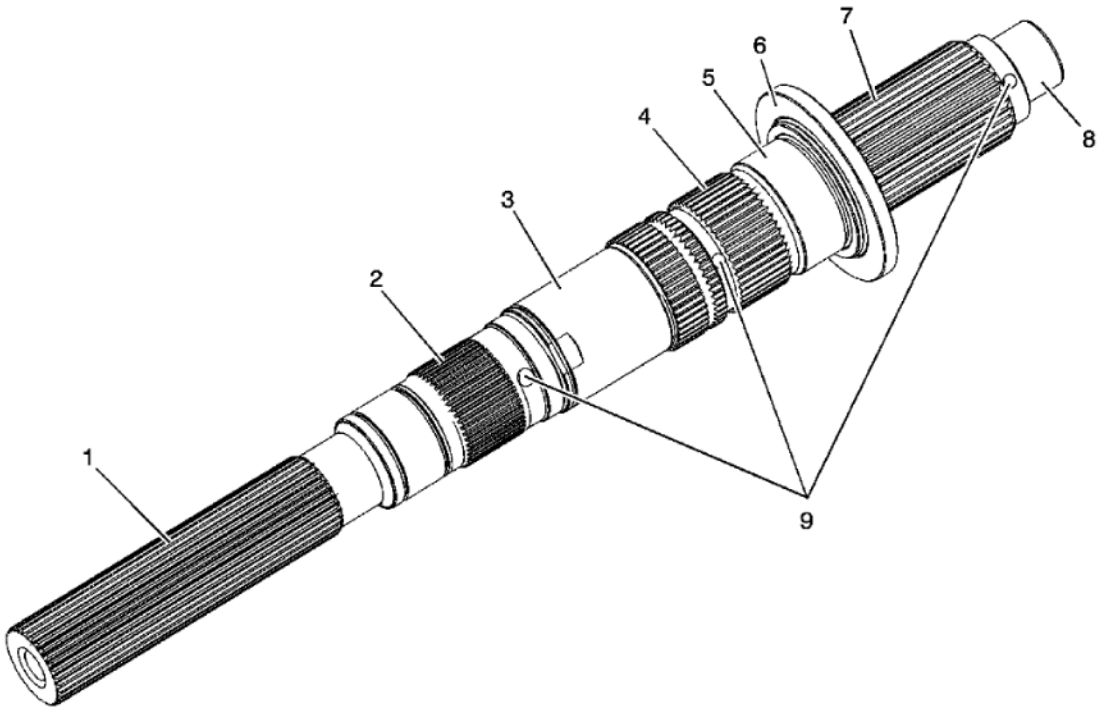


Fig. 33: Rear Output Shaft Cleaning and Inspection
Courtesy of GENERAL MOTORS CORP.

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 Rear Output Shaft Splines **Tip:** Witness marks at the location of the yoke are normal.
	Transfer Case Oil Pump and Rear Output Shaft Speed Reluctor Wheel Engagement Splines

2	**Tip:** Witness marks at the location of the components are normal.
3	Transfer Case Front Output Shaft Drive Sprocket Bearing Surface **Tip:** Inspect for scoring, brinelling, pitting, or excessive wear.
4	Transfer Case Two/Four Wheel Drive Clutch Hub Engagement Splines **Tip:** Witness marks at the location of the hub is normal.
5	Transfer Case Control Actuator Lever Bearing Surface **Tip:** Inspect for scoring, brinelling, pitting, or excessive wear.
6	Transfer Case Control Actuator Lever Thrust Bearing Surface **Tip:** Inspect for scoring, brinelling, pitting, or excessive wear.
7	Transfer Case High/Low Clutch Engagement Splines **Tip:** Witness marks at the location of the high/low clutch is normal.
8	Transfer Case Input Shaft Pilot Bearing Surface **Tip:** Inspect for scoring, brinelling, pitting, or excessive wear.
9	Oil Galleries **Tip:** Compressed air may be necessary to clean the oil galleries.

FRONT OUTPUT SHAFT AND INPUT SHAFT CLEANING AND INSPECTION

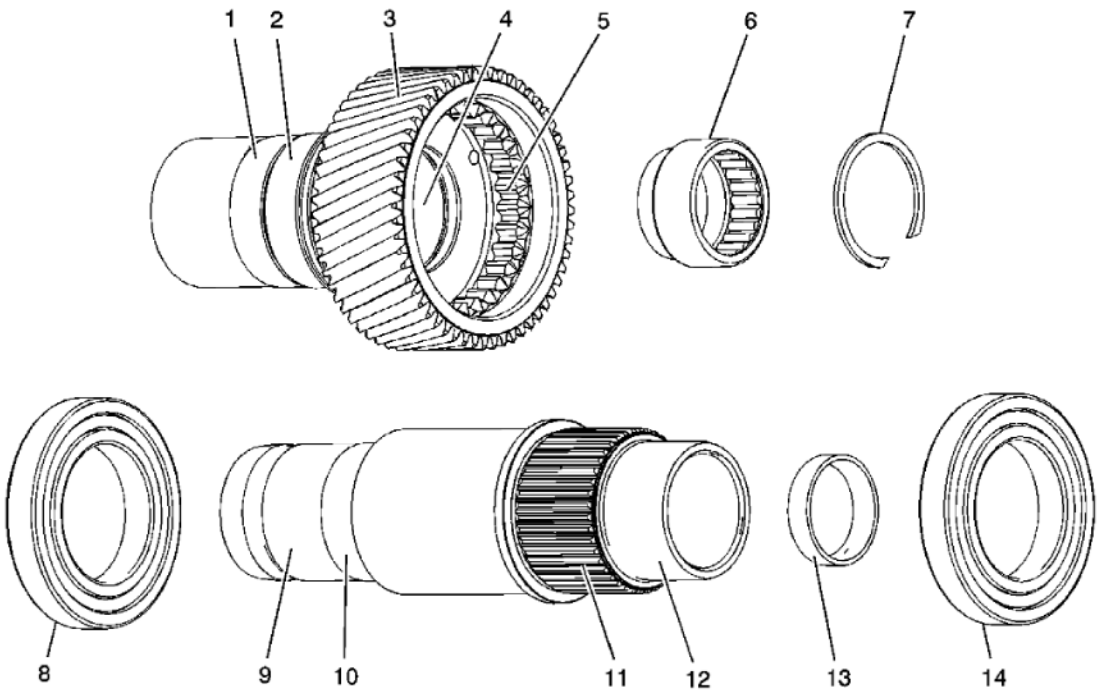


Fig. 34: Front Output Shaft and Input Shaft Cleaning and Inspection
Courtesy of GENERAL MOTORS CORP.

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 Input Shaft Seal Surface **Tip:** Inspect for pitting, excessive wear, or damage.
2	Transfer Case Input Shaft Bearing Surface **Tip:** Inspect for excessive wear, damage, or if the bearing has spun on the shaft.
3	Transfer Case Input Shaft Planetary Teeth **Tip:** Inspect for broken, damaged, or debris embedded in the root of the teeth.
4	Transfer Case Input Shaft Pilot Bearing Surface **Tip:** 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 **Tip:** Inspect the engagement teeth for chips or excessive wear.
6	Transfer Case Input Shaft Pilot Bearing Assembly **Tip:** Replace the bearing if roughness, brinelling, or pitting is detected. Refer to **Input Shaft Pilot Bearing Replacement (Light Duty)** or **Input Shaft Pilot Bearing Replacement (Heavy Duty and Super Heavy Duty)** .
7	Transfer Case Input Shaft Pilot Bearing Assembly Retaining Ring (HD only)
8	Transfer Case Front Output Shaft Front Bearing Assembly **Tip:** Replace the bearing if roughness, brinelling, or pitting is detected. Refer to **Front Output Shaft Front and Rear Bearing Replacement** .
9	Transfer Case Front Output Shaft Seal Surface **Tip:** Inspect for pitting, excessive wear, or damage.
10	Transfer Case Front Output Shaft Front Bearing Surface **Tip:** If the bearing is removed, inspect for excessive wear, damage, or if the bearing has spun on the shaft.
11	Transfer Case Front Output Shaft Driven Sprocket Engagement Splines **Tip:** Witness marks at the location of the sprocket is normal.
12	Transfer Case Front Output Shaft Rear Bearing Surface **Tip:** If the bearing is removed, inspect for excessive wear, damage, or if the bearing has spun on the shaft.
13	Transfer Case Front Output Shaft Hole Plug **Tip:** Replace the plug if removed. Refer to **Front Output Shaft Front and Rear Bearing Replacement** .
	Transfer Case Front Output Shaft Rear Bearing

14	Assembly **Tip:** Replace the bearing if roughness, brinelling, or pitting is detected. Refer to **Front Output Shaft Front and Rear Bearing Replacement** .

DRIVE CHAIN, DRIVE SPROCKET, AND DRIVEN SPROCKET CLEANING AND INSPE INSPECTION

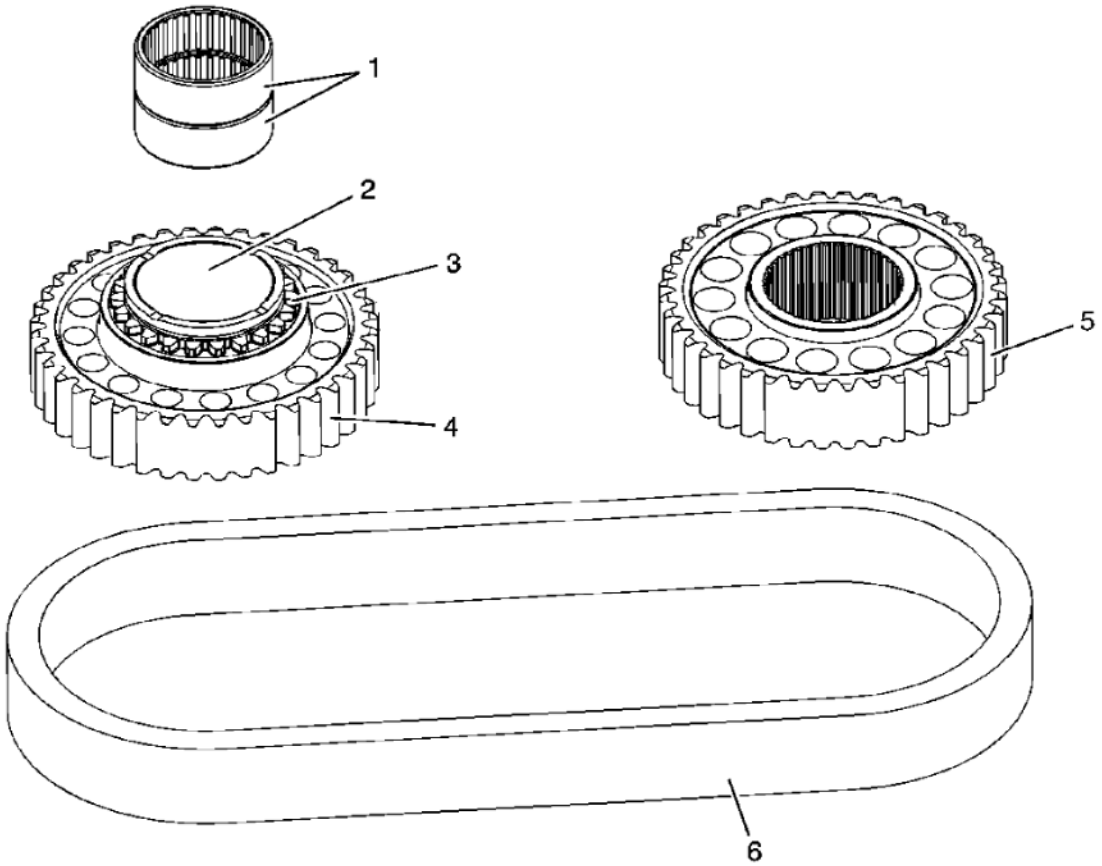


Fig. 35: Drive Chain, Drive Sprocket, and Driven Sprocket Cleaning and Inspection
Courtesy of GENERAL MOTORS CORP.

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.	

• Replace any components if damage is found in this procedure. The sprockets must be replaced as a pair. • Clean all components in cleaning solvent and air dry.	
1	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly **Tip:** Replace the bearings if roughness, brinelling, or pitting is detected. Refer to **Front Output Shaft Drive Sprocket Bearing Replacement** .
2	Transfer Case Front Output Shaft Drive Sprocket Bearing Bore **Tip:** 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 **Tip:** Inspect the engagement teeth for chips or excessive wear.
4	Transfer Case Front Output Shaft Drive Sprocket **Tip:** • 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 **Tip:** • 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 **Tip:** Inspect for loose link pins, binding or stiff links, debris embedded in the links, or worn teeth surfaces.

HIGH/LOW PLANETARY CARRIER CLEANING AND INSPECTION

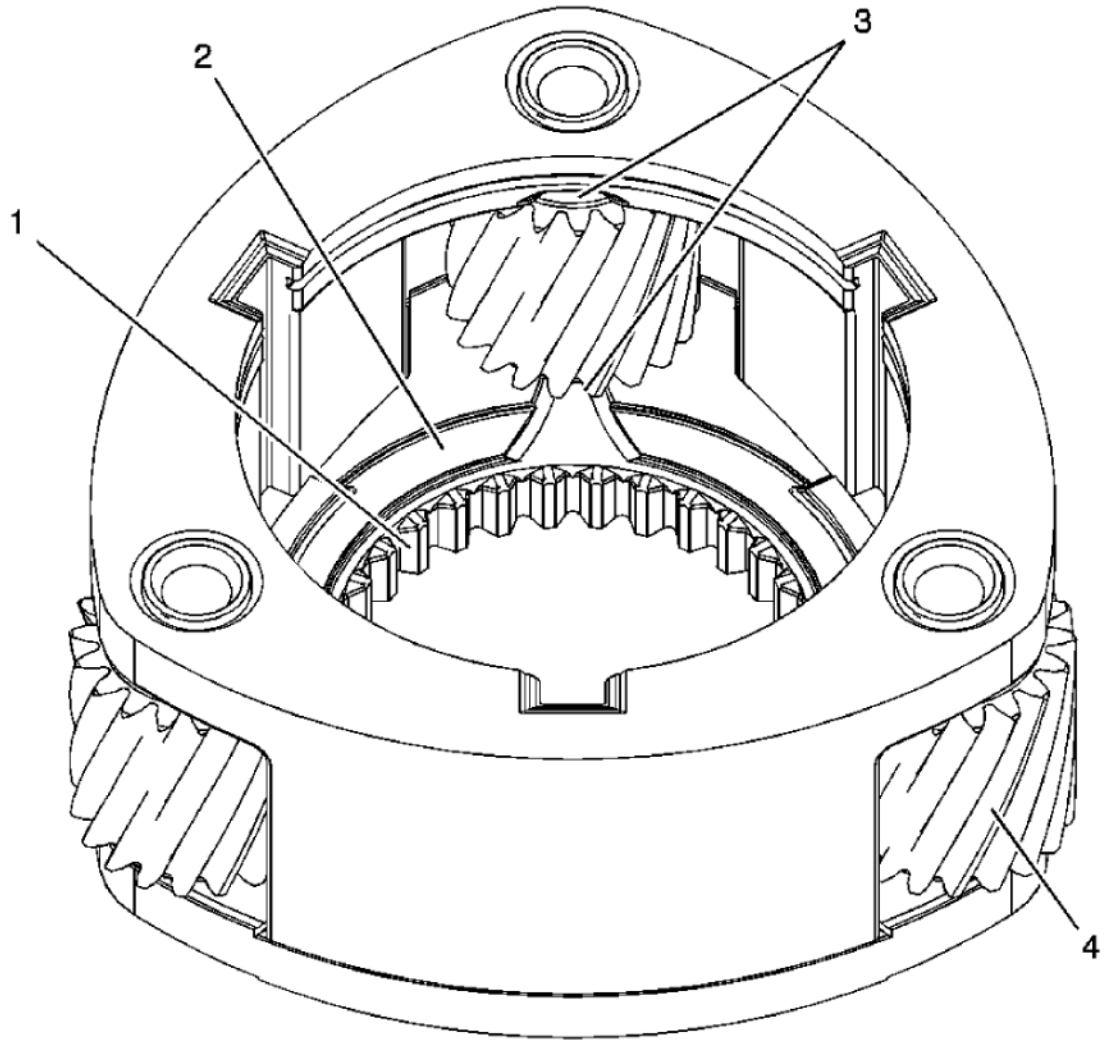


Fig. 36: High/Low Planetary Carrier Cleaning and Inspection
Courtesy of GENERAL MOTORS CORP.

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. Do not spin the planetary gears with compressed air. • The high/low planetary carrier is only serviced as an assembly.	
	Transfer Case High/Low Clutch Engagement

1	Teeth **Tip:** Inspect the engagement teeth for chips or excessive wear.
2	Transfer Case Planetary Carrier Sun Gear Thrust Washer Surface **Tip:** Inspect the thrust washer surface for scoring or excessive wear.
3	Transfer Case High/Low Planetary Carrier Pinion Gear Thrust Washer **Tip:** Inspect for a thrust washer being on each side of the planetary gears.
4	Transfer Case High/Low Planetary Pinion Gear **Tip:** Inspect for broken, damaged, or debris embedded in the root of the teeth.

HIGH/LOW SHIFT COMPONENTS CLEANING AND INSPECTION

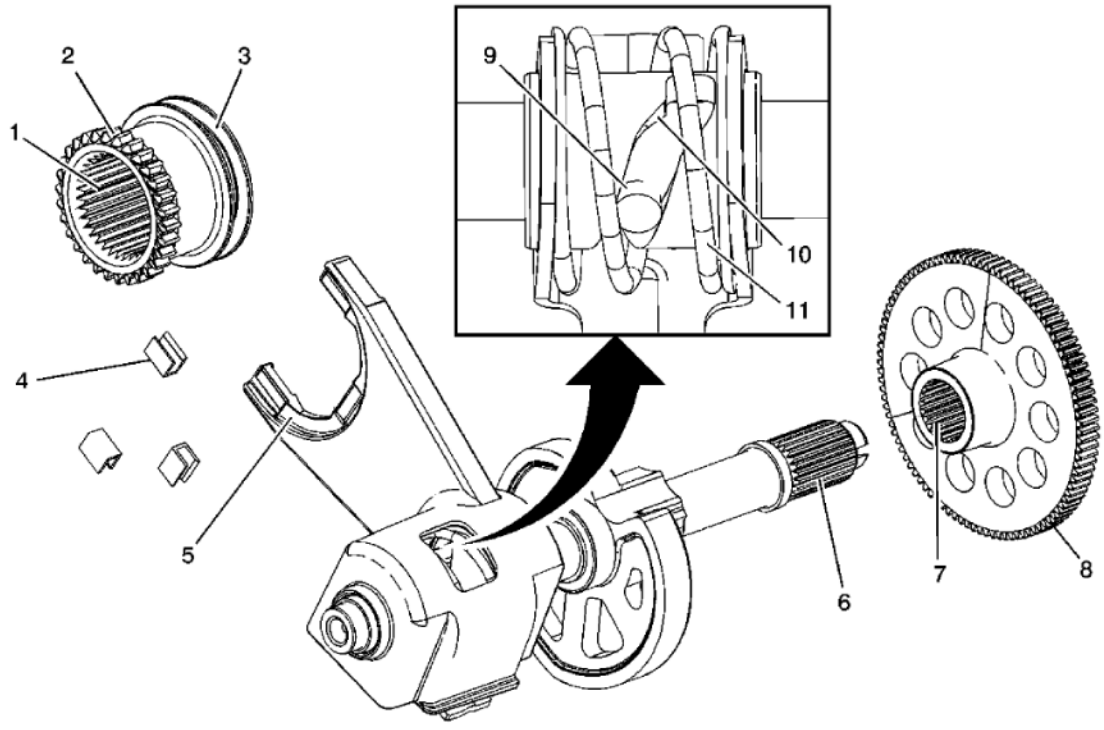


Fig. 37: High/Low Shift Components Cleaning and Inspection
Courtesy of GENERAL MOTORS CORP.

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 High/Low Clutch Inner Splines **Tip:** Inspect the inner splines for excessive looseness on the rear output shaft.
2	Transfer Case High/Low Clutch Teeth **Tip:** Inspect the engagement teeth for chips or excessive wear.
3	Transfer Case High/Low Shift Fork Collar **Tip:** Inspect the shift fork collar for wear.
4	Transfer Case High/Low Shift Fork Pads **Tip:** Inspect the pads for wear.
5	Transfer Case High/Low Shift Fork **Tip:** Inspect for cracks, broken areas, or other damage. The component must be replaced if damage is found. Refer to **High/Low Shift Fork Replacement**.
6	Transfer Case Control Actuator Shaft **Tip:** Inspect the shaft splines for excessive wear. The component must be replaced if damage is found. Refer to **High/Low Shift Fork Replacement**.
7	Transfer Case Actuator Shaft Gear Splines **Tip:** Witness marks at the location of the splines is normal.
8	Transfer Case Actuator Shaft Gear Teeth **Tip:** Inspect for chipped teeth, excessively worn gear surfaces, and debris embedded in the root of the teeth.
9	Transfer Case High/Low Shift Fork Pin **Tip:** Inspect the pin for wear. The component must be replaced if damage is found. Refer to **High/Low Shift Fork Replacement**.

10	Transfer Case High/Low Shift Fork Spring Assembly **Tip:** Inspect the cam lobes for wear or roughness. The component must be replaced if damage is found. Refer to **High/Low Shift Fork Replacement**.
11	Transfer Case Shift Fork Spring **Tip:** Inspect the spring for breakage. The component must be replaced if damage if found. Refer to **High/Low Shift Fork Replacement**.

TWO/FOUR WHEEL DRIVE SHIFT COMPONENTS CLEANING AND INSPECTION

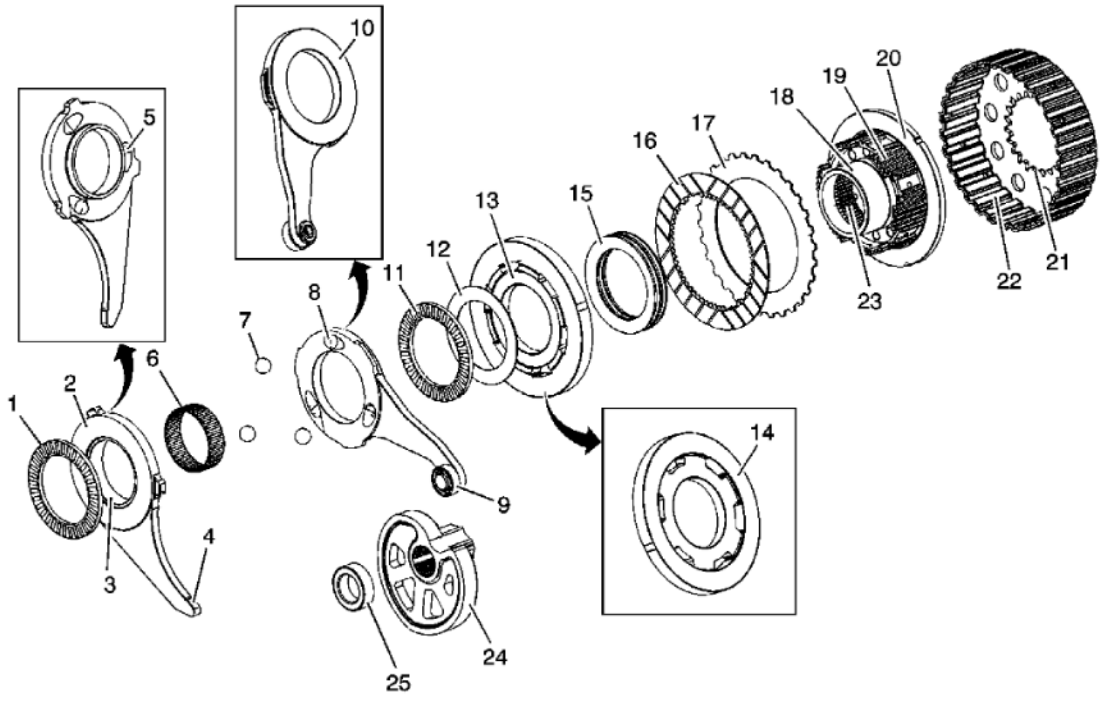


Fig. 38: Two/Four Wheel Drive Shift Components Cleaning and Inspection
Courtesy of GENERAL MOTORS CORP.

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, except the clutch plates.

1	Transfer Case Control Actuator Thrust Bearing **Tip:** Replace the bearing if roughness, brinelling, or pitting is detected.
2	Transfer Case Control Actuator Lever Thrust Bearing Surface **Tip:** Inspect for pitting, excessive wear, or damage.
3	Transfer Case Control Actuator Lever Bearing Surface **Tip:** Inspect for pitting, excessive wear, or damage.
4	Transfer Case Control Lever Arm **Tip:** Inspect for excessive wear or damage.
5	Transfer Case Control Actuator Lever Ball Ramps **Tip:** Inspect for pitting, excessive wear, or damage.
6	Transfer Case Control Actuator Lever Bearing **Tip:** Replace the bearing if roughness, brinelling, or pitting is detected.
7	Transfer Case Control Actuator Lever Balls **Tip:** Replace the bearings if roughness or pitting is detected.
8	Transfer Case Control Actuator Lever Ball Ramps **Tip:** Inspect for pitting, excessive wear, or damage.
9	Transfer Case Control Actuator Lever Bearing **Tip:** Replace the control actuator lever assembly if roughness, brinelling, or pitting is detected.
10	Transfer Case Control Actuator Lever Bearing Surface **Tip:** Inspect for pitting, excessive wear, or damage.
11	Transfer Case Control Actuator Thrust Bearing **Tip:** Replace the bearing if roughness, brinelling,

	or pitting is detected.
12	Transfer Case Control Actuator Lever Washer **Tip:** Inspect for pitting, excessive wear, or damage.
13	Transfer Case Four Wheel Drive Clutch Pressure (Apply) Plate Washer Surface **Tip:** Inspect for pitting, excessive wear, or damage.
14	Transfer Case Four Wheel Drive Clutch Pressure (Apply) Plate Surface **Tip:** Inspect for excessive wear, cracks, or damage.
15	Transfer Case Four Wheel Drive Clutch Pressure Plate Springs **Tip:** Inspect the springs for cracks.
16	Transfer Case Four Wheel Drive Clutch Pressure (Friction) Plates **Tip:** Inspect for worn, grooved, burnt, or flaking friction material, or warped friction plates.
17	Transfer Case Four Wheel Drive Clutch Pressure (Steel) Plates **Tip:** Inspect for worn or warped steel plates.
18	Transfer Case Four Wheel Drive Clutch Hub Bearing Surface **Tip:** Inspect for pitting, excessive wear, or damage.
19	Transfer Case Four Wheel Drive Clutch Hub Teeth **Tip:** Inspect for excessive wear or damage. Excessive wear can be identified by steps in the teeth.
20	Transfer Case Four Wheel Drive Clutch Hub Friction Plate Surface **Tip:** Inspect for excessive wear, cracks, or damage.
21	Transfer Case Front Output Shaft Drive Sprocket Engagement Teeth **Tip:** Inspect the engagement teeth for excessive

	looseness on the front output shaft drive sprocket.
22	Transfer Case Four Wheel Drive Clutch Housing Teeth **Tip:** Inspect for excessive wear or damage. Excessive wear can be identified by steps in the teeth.
23	Transfer Case Four Wheel Drive Clutch Hub Splines **Tip:** Inspect the splines for excessive looseness on the rear output shaft.
24	Transfer Case Two/Four Wheel Drive Actuator Cam **Tip:** Inspect the cam lobes for wear or roughness. Refer to **High/Low Shift Fork Replacement** if damage is found.
25	Transfer Case Two/Four Wheel Drive Actuator Cam Spacer **Tip:** Inspect the spacer for wear or roughness. Refer to **High/Low Shift Fork Replacement** if damage is found.

TRANSFER CASE FOUR WHEEL DRIVE ACTUATOR LEVER SHAFT BEARING REPLA REPLACEMENT - FRONT

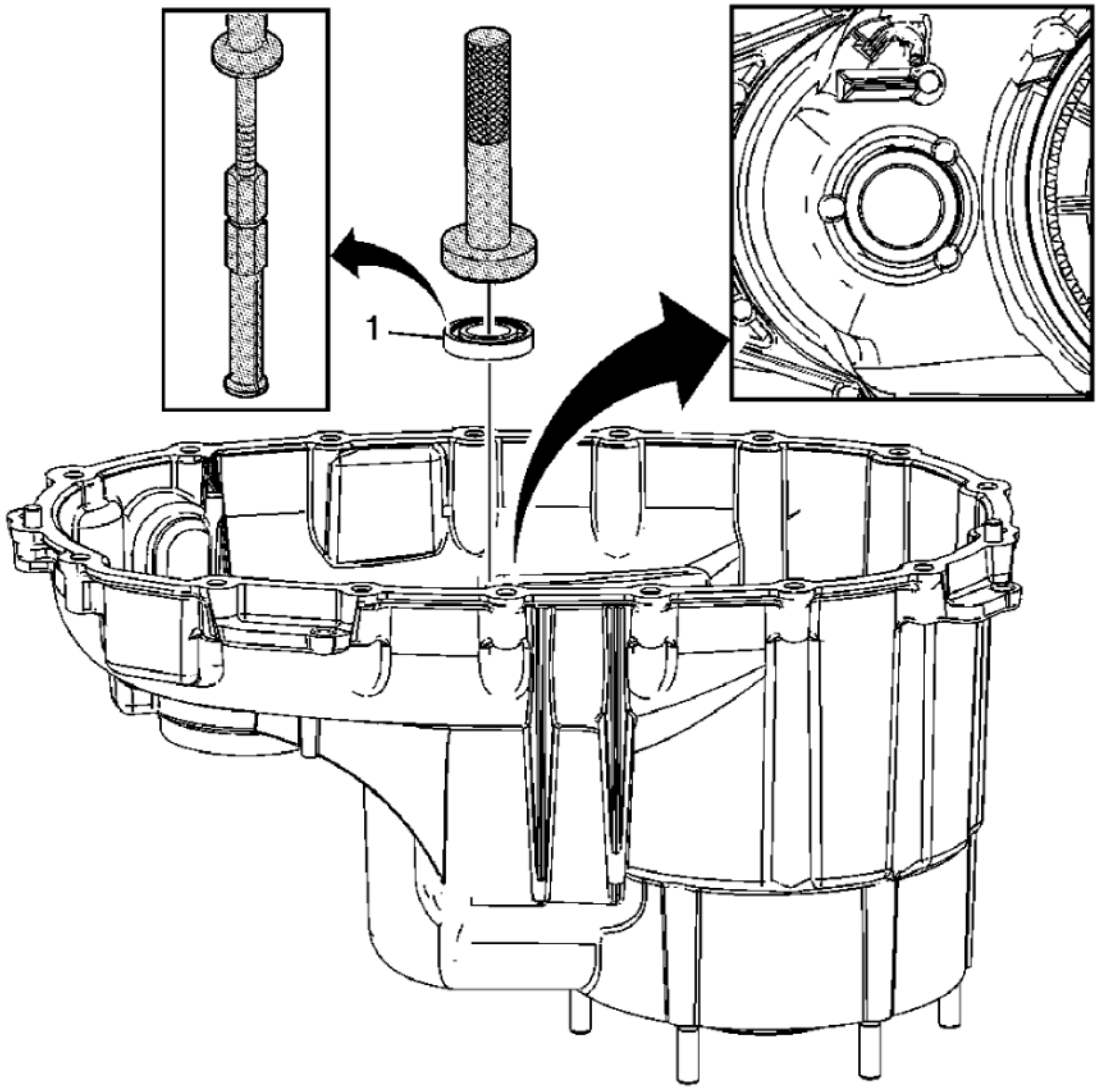


Fig. 39: Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Replacement - Front
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Ensure the bearing is installed squarely into the bearing bore.	
	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Assembly **Tip:** • Ensure the printing on the bearing is facing

1	upward. • A suitable adapter is required to use with **J 8092** . • Press the bearing until the bearing bottoms on the front case half. **Special Tools** • **J 2619-01** Slide Hammer • **J 8092** Driver Handle • **J 44737** Shift Rail Bearing Remover. See **Special Tools**.

TRANSFER CASE FOUR WHEEL DRIVE ACTUATOR LEVER SHAFT BEARING REPLA REPLACEMENT - REAR

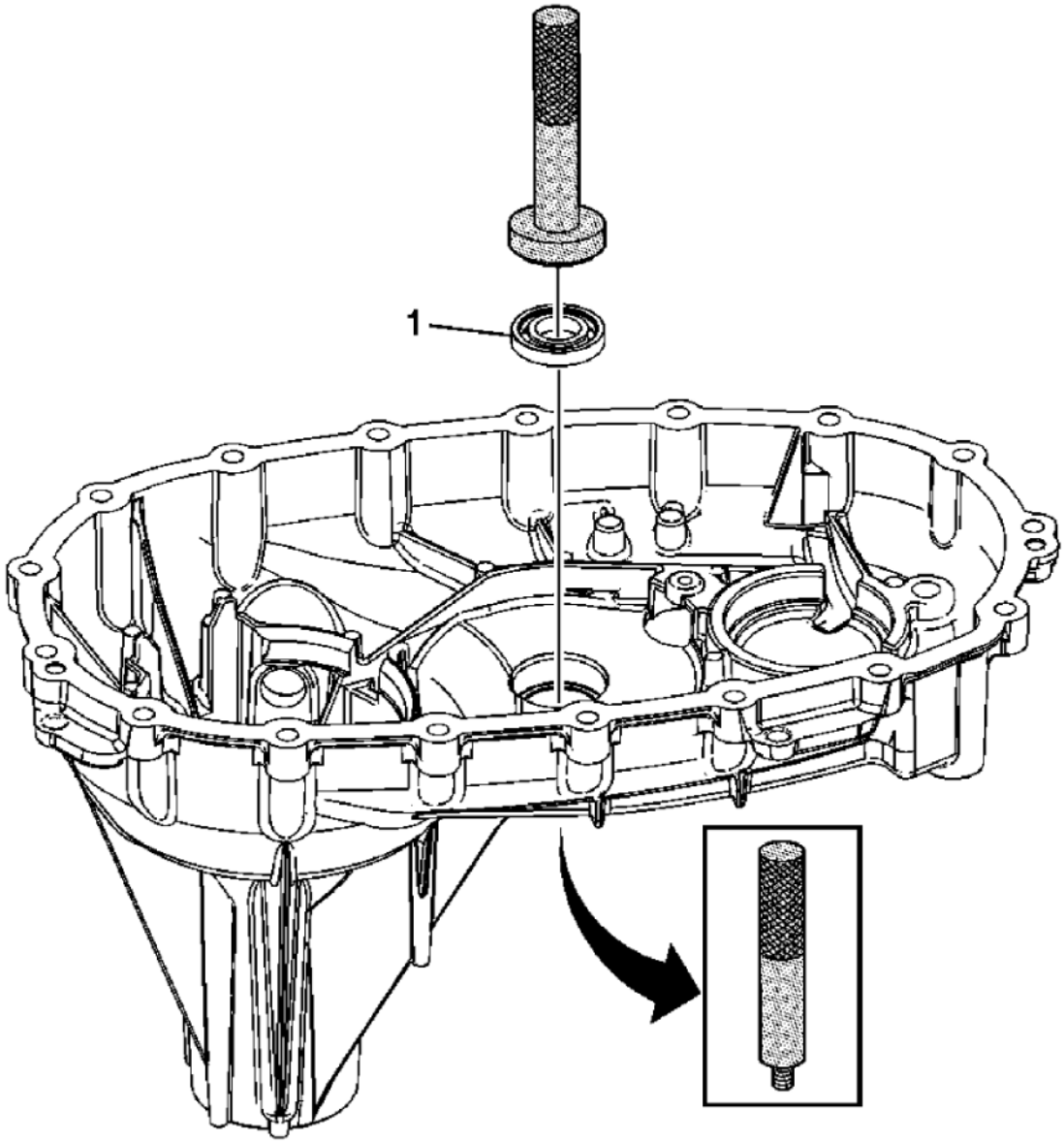


Fig. 40: Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Replacement - Rear
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Ensure the bearing is installed squarely into the bearing bore.	
	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Assembly **Tip:**

1	• Ensure the printing on the bearing is facing upward. • A suitable adapter is required to use with **J 8092** to install. • Press the bearing until the bearing bottoms on the rear case half. **Special Tools:** **J 8092** Driver Handle

INPUT SHAFT PILOT BEARING REPLACEMENT (LIGHT DUTY)

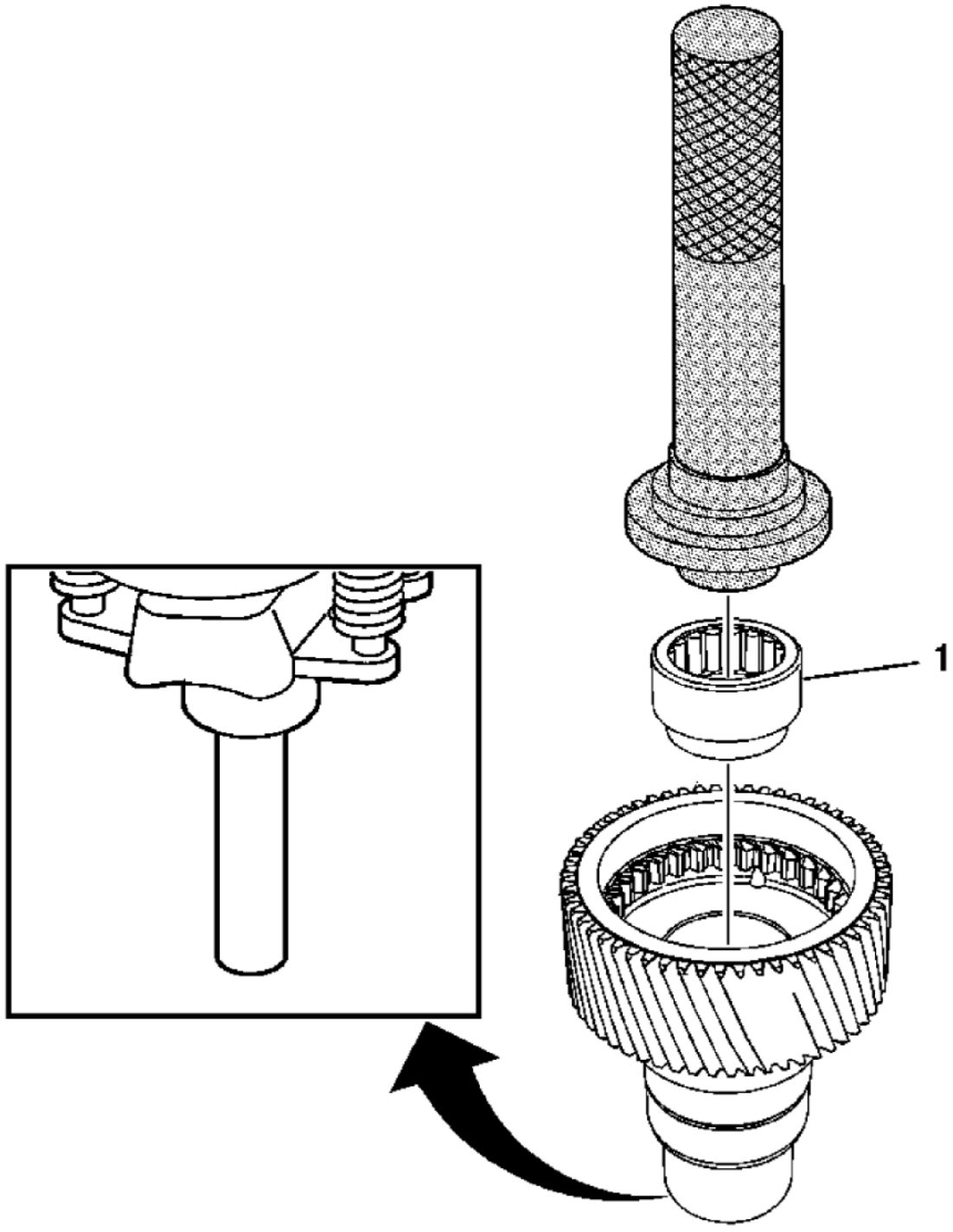


Fig. 41: Input Shaft Pilot Bearing Replacement (Light Duty)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

Preliminary Procedure: Ensure the bearing is installed squarely into the input shaft bore.	
1	Transfer Case Input Shaft Pilot Bearing **Tip:** • Using a suitable adapter and an arbor press, remove the input shaft pilot bearing by going through the front of the input gear. • Install the bearing using the small side of the **DT-48212** . • Press the bearing until the tool bottoms on the input shaft. **Special Tools** • **DT-48212** Input Shaft Pilot Bearing Installer • **J 8092** Driver Handle

INPUT SHAFT PILOT BEARING REPLACEMENT (HEAVY DUTY AND SUPER HEAVY DUTY) DUTY)

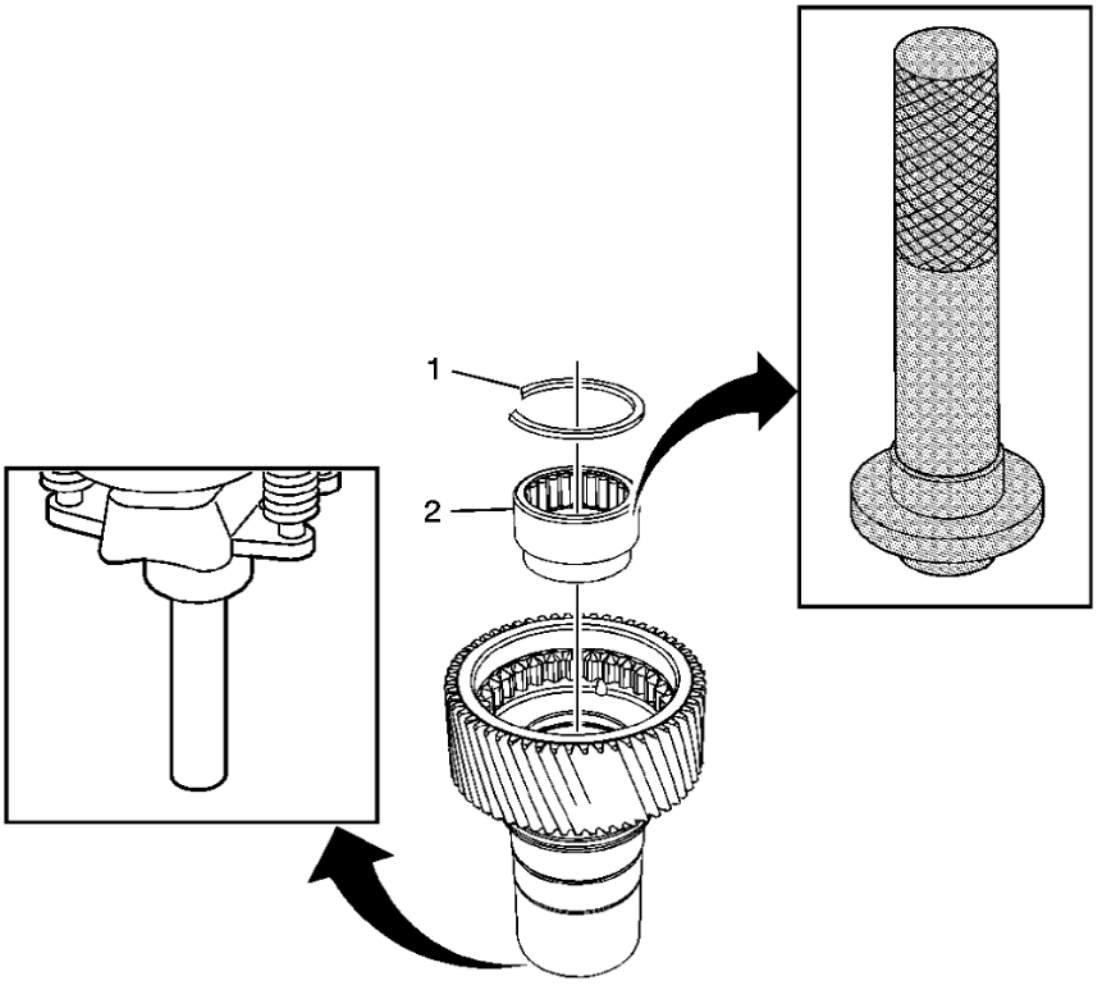


Fig. 42: Input Shaft Pilot Bearing Replacement (Heavy Duty and Super Heavy Duty)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Ensure the bearing is installed squarely into the input shaft bore.	
1	Transfer Case Input Shaft Pilot Bearing Retaining Ring **Tip:** The pilot bearing retaining ring must be removed and installed before and after the pilot bearing is replaced.
	Transfer Case Input Shaft Pilot Bearing **Tip:**

2	• Using a suitable adapter and an arbor press, remove the input shaft pilot bearing by going through the front of the input shaft. • Install the bearing using the large side of the **DT-48212** . • Press the bearing until the tool bottoms on the input shaft. **Special Tools** • **DT-48212** Input Shaft Pilot Bearing Installer • **J 8092** Driver Handle

FRONT OUTPUT SHAFT FRONT AND REAR BEARING REPLACEMENT

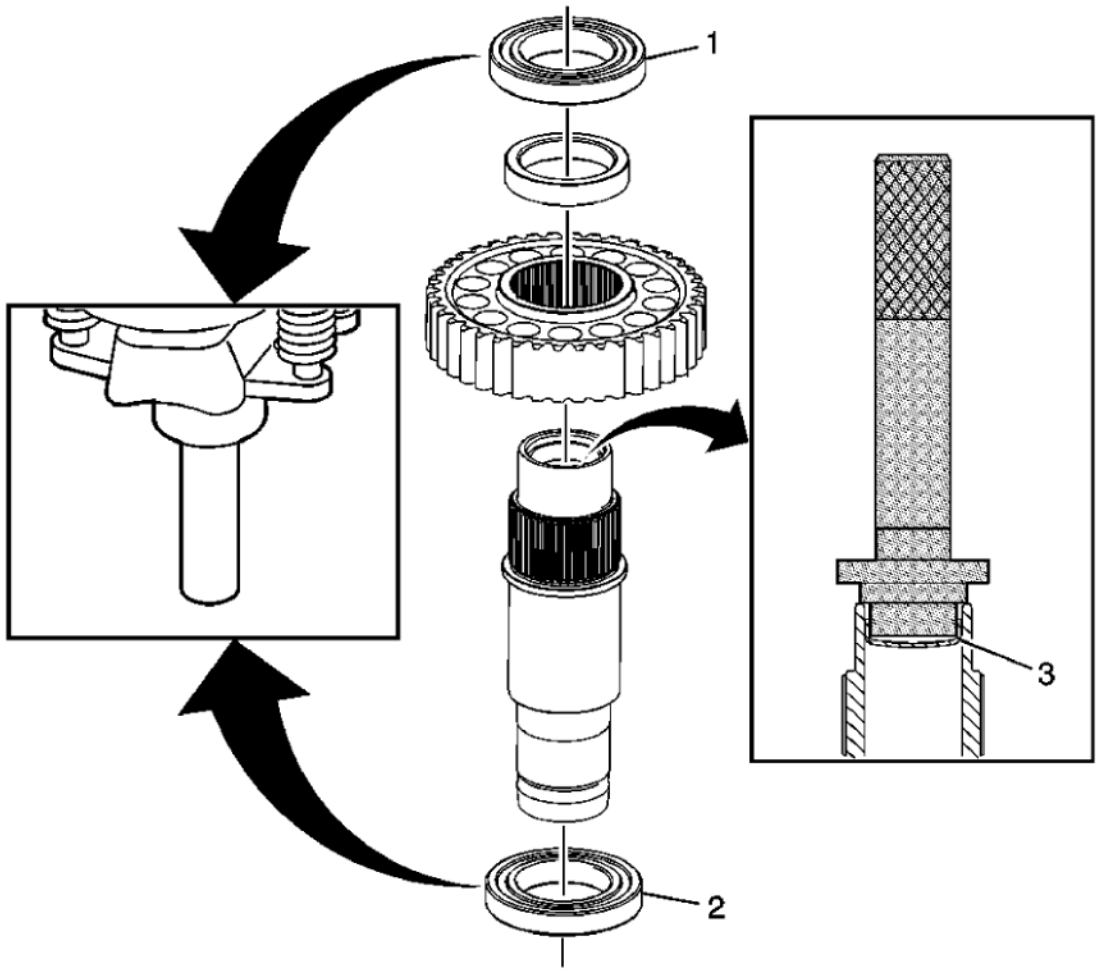


Fig. 43: Front Output Shaft Front and Rear Bearing Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure • Ensure the bearings are installed squarely on the front output shaft. • Using a suitable adapter and an arbor press, remove the bearing assemblies from the front output shaft.	
1	Transfer Case Front Output Shaft Rear Bearing Assembly **Tip:** Using a suitable adapter and an arbor press, install the bearing until the bearing bottoms against the spacer.

2	Transfer Case Front Output Shaft Front Bearing Assembly **Tip:** Using a suitable adapter and an arbor press, install the bearing until the bearing bottoms on the front output shaft.
3	Transfer Case Front Output Shaft Hole Plug **Tip:** • Using a suitable adapter and an arbor press, remove the front output shaft hole plug by going through the front of the front output shaft. • Install the plug using the large side of the **DT-48212** . • Press the plug until the tool bottoms on the front output shaft. **Special Tools** • **DT-48212** Input Shaft Pilot Bearing Installer • **J 8092** Driver Handle

FRONT OUTPUT SHAFT DRIVE SPROCKET BEARING REPLACEMENT

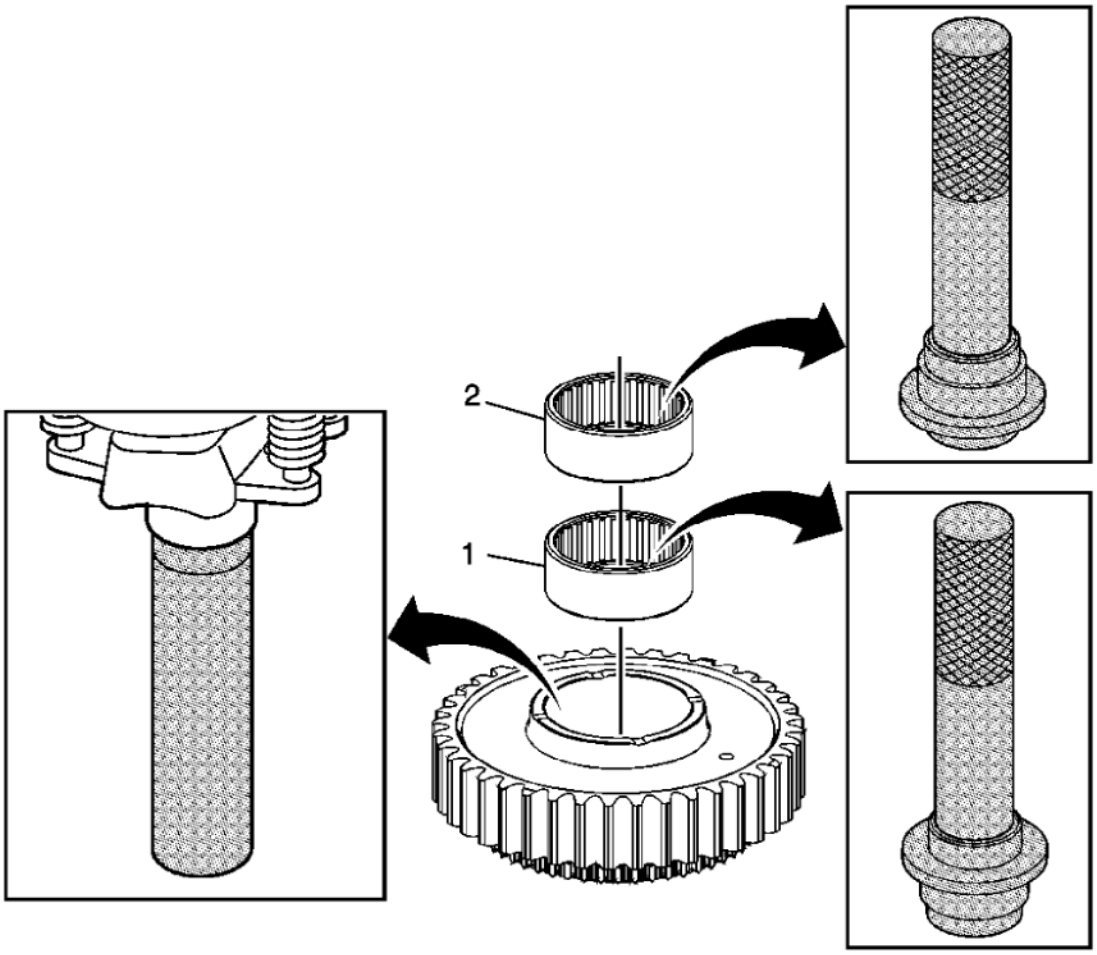


Fig. 44: Front Output Shaft Drive Sprocket Bearing Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure • Using the **J 35512** and an arbor press, remove the bearing assemblies from the drive sprocket. • Ensure the bearings are installed squarely into the drive sprocket bore.	
	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly - Front **Tip:** • Install the bearing using the long side of the **DT-48211** .

1	• Ensure the flat edge of the bearing is facing upward. • Using an arbor press or hammer, install the bearing until the tool bottoms on the drive sprocket. **Special Tools** • **DT-48211** Drive Sprocket Bearing Installer • **J 8092** Driver Handle • **J 35512** Inner Pinion Bearing Installer
2	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly - Rear **Tip:** • Install the bearing using the short side of the **DT-48211** . • Ensure the flat edge of the bearing is facing upward. • Using an arbor press or hammer, install the bearing until the tool bottoms on the drive sprocket. **Special Tools** • **DT-48211** Drive Sprocket Bearing Installer • **J 8092** Driver Handle • **J 35512** Inner Pinion Bearing Installer

HIGH/LOW SHIFT FORK REPLACEMENT

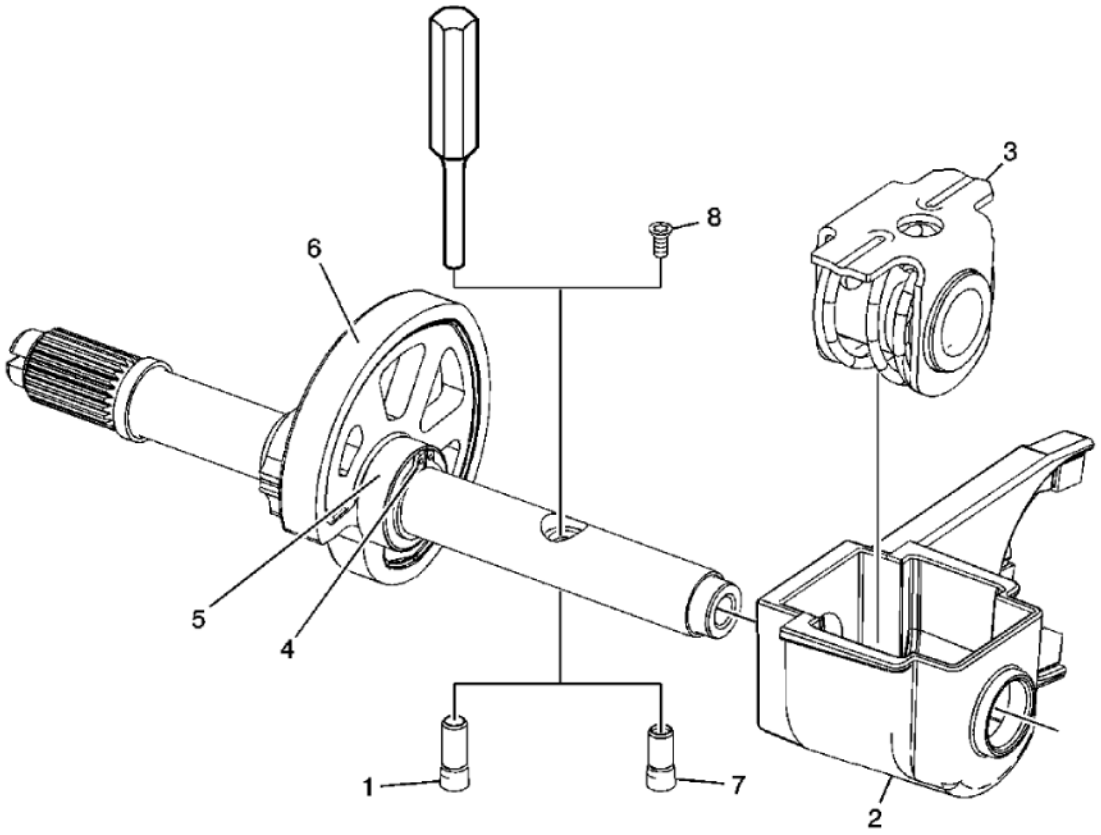


Fig. 45: High/Low Shift Fork Replacement
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Transfer Case High/Low Shift Fork Pin **Tip:** Drive the pin out using a drift punch and hammer.
2	Transfer Case High/Low Shift Fork **Tip:** 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 Assembly **Tip:** 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
7	Transfer Case High/Low Shift Fork - Service - Pin **Tip:** • Apply a small amount of threadlock GM P/N 12345493 (Canadian P/N 10953488), or equivalent, to the shaft of the pin before installation. • Press the pin into the control actuator shaft using a brass drift until bottom.
8	Transfer Case Shift Fork Shaft Guide Screw **NOTE:** **Refer to Fastener Notice .** **Tip:** Apply threadlock GM P/N 12345493 (Canadian P/N 10953488), or equivalent, to the screw threads. **Tighten:** 5 N.m (44 lb in).

TRANSFER CASE ASSEMBLE

Input Shaft and Planetary Assembly Installation

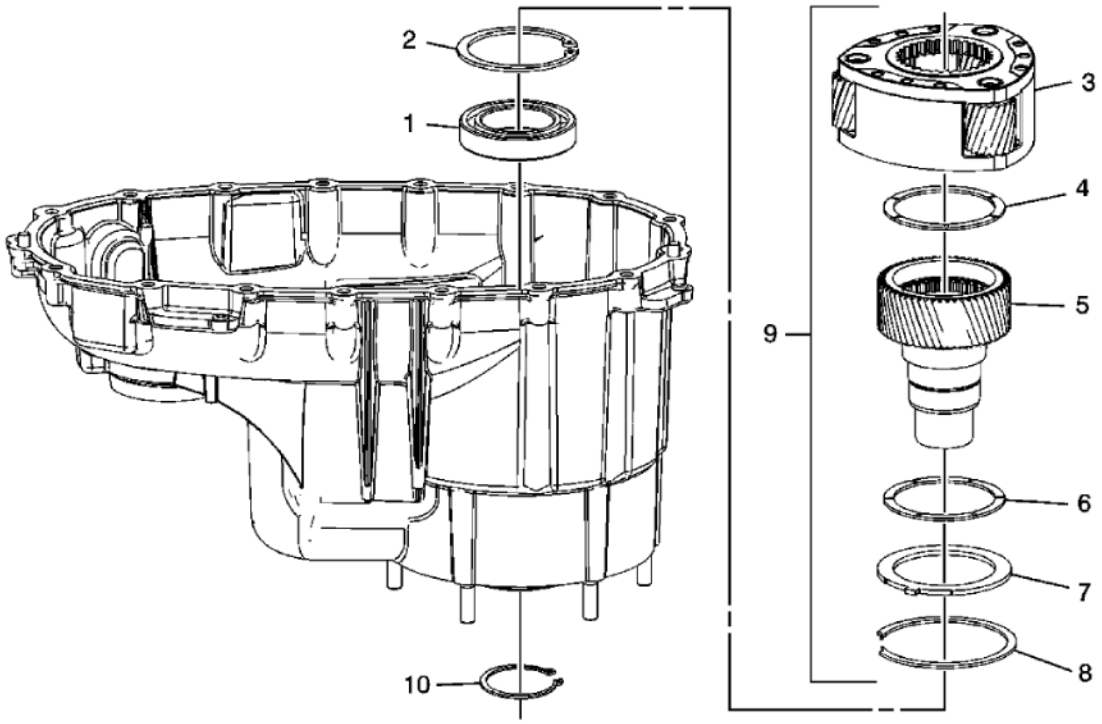


Fig. 46: Input Shaft and Planetary Assembly Installation
Courtesy of GENERAL MOTORS CORP.

Input Shaft and Planetary Assembly Installation

Callout	Component Name
1	Transfer Case Input Shaft Bearing Assembly
2	Transfer Case Input Shaft Inner Retaining Ring
3	Transfer Case High/Low Planetary Carrier Assembly
4	Transfer Case Planetary Carrier Sun Gear Thrust Washer
5	Transfer Case Input Shaft
6	Transfer Case Planetary Carrier Sun Gear Thrust Washer
7	Transfer Case High/Low Locking Plate
8	Transfer Case High/Low Planetary Carrier Retaining Ring
9	Transfer Case Input Shaft/Planetary Assembly
10	Transfer Case Input Shaft Bearing Outer Retaining

	Ring

Measuring Clutch Pack Height

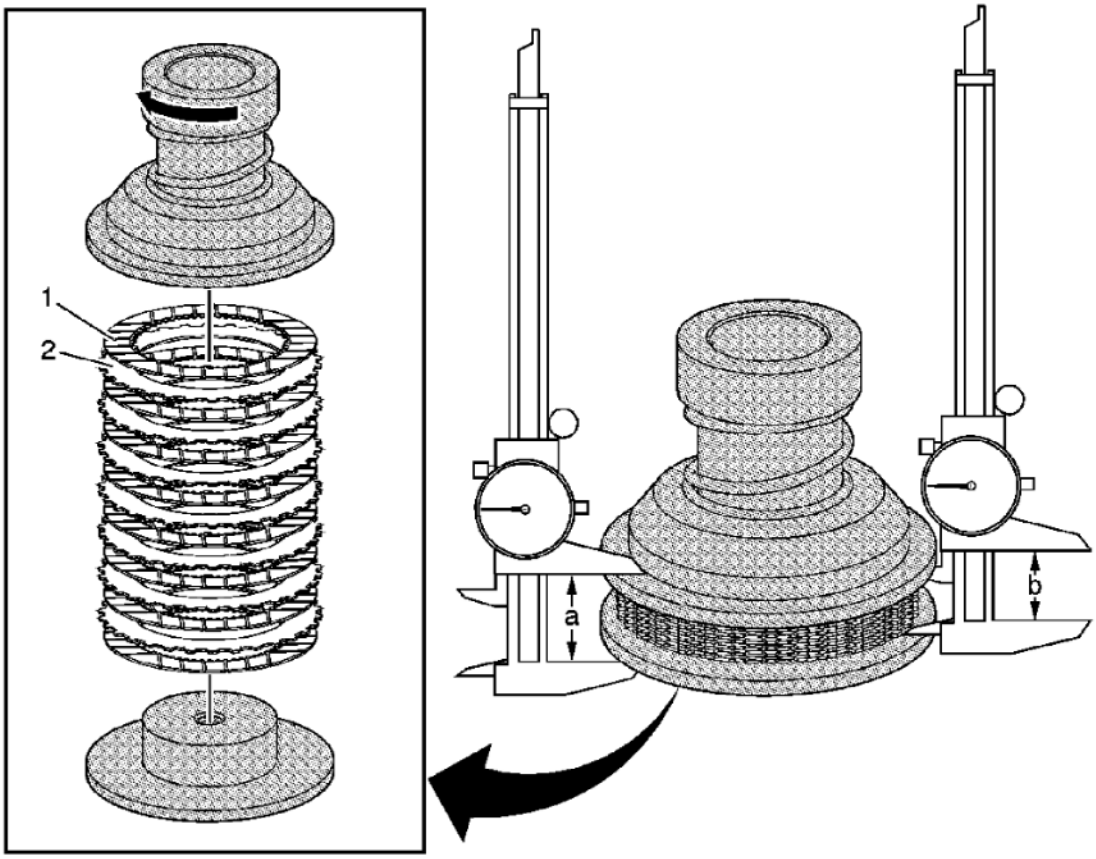


Fig. 47: Measuring Clutch Pack Height
Courtesy of GENERAL MOTORS CORP.

Measuring Clutch Pack Height

Callout	Component Name
Tip: • The **DT-48213** applies a predetermined amount of pressure to the clutch pack in order to properly measure the clutch pack height. See **Special Tools**. Do not use any other method than what is outlined below. • Micrometers or depth gages may also be used in conjunction with the **DT-48213** to measure the clutch pack height. See **Special Tools**. • 2 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 Pressure - Friction - Plates (Qty: 8) **Tip:** Install the friction and steel clutch plates into the **DT-48213** , alternating until 8 friction plates and 7 steel plates are installed. See **Special Tools**.
2	Transfer Case Four Wheel Drive Clutch Pressure - Steel - Plates (Qty: 7) **Tip:** Install the friction and steel clutch plates into the **DT-48213** , alternating until 8 friction plates and 7 steel plates are installed. See **Special Tools**. **Procedure 1 - Outside Measurement:** 1. Tighten the **DT-48213** until the upper portion of the tool contacts the lower portion of the tool. See **Special Tools**. The screw will be flush with the bottom surface of the tool to indicate the tool has fully compressed the clutch plates. 2. Using an outside caliper, measure the total combined height of the clutch pack and the **DT-48213** , dimension a. See **Special Tools**. Subtract the thickness of both the upper and lower portion of the **DT-48213** , 14 mm (0. See **Special Tools**.551 in), and record the results. 3. Repeat the process in 2 additional locations, 120 degrees from each other. 4. The average of the 3 measurements is the clutch pack height. **Procedure 2 - Inside Measurement:** 1. Tighten the **DT-48213** until the upper portion of the tool contacts the lower portion of the tool. See **Special Tools**. The screw will be flush with the bottom surface of the tool to indicate the tool has fully compressed the clutch plates. 2. Using an inside caliper, measure the height of the clutch pack, dimension b, and record the results.

	3. Repeat the process in 2 additional locations, 120 degrees from each other. 4. The average of the 3 measurements is the clutch pack height. **Special Tools:** **DT-48213** Clutch Pack Height Gage. See **Special Tools**.

Clutch Assembly Installation

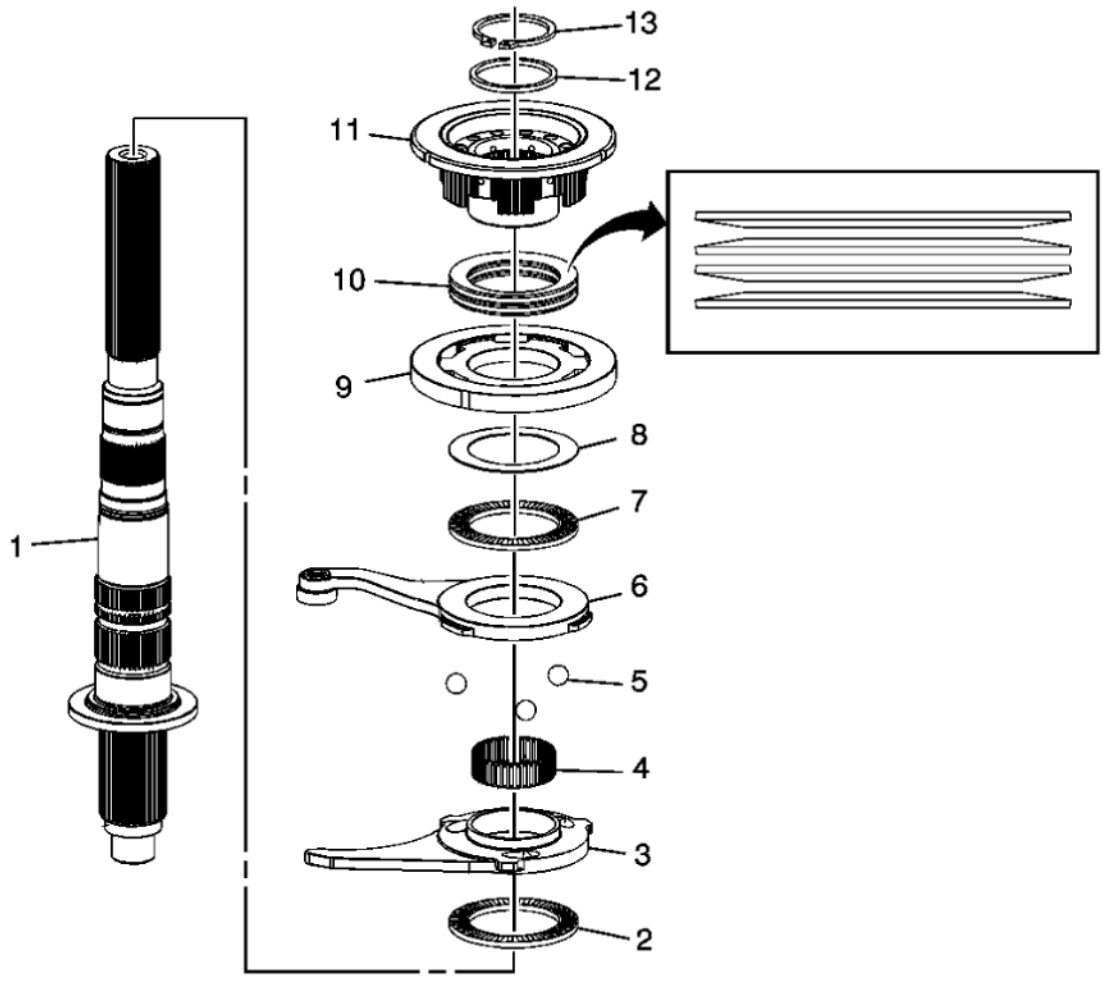


Fig. 48: Clutch Assembly Installation
Courtesy of GENERAL MOTORS CORP.

Clutch Assembly Installation

Callout	Component Name
1	Transfer Case Rear Output Shaft
2	Transfer Case Control Actuator Lever Thrust Bearing Assembly
3	Transfer Case Control Lever
4	Transfer Case Control Actuator Lever Bearing Assembly
5	Transfer Case Control Actuator Lever Ball (Qty: 3)
6	Transfer Case Control Actuator Lever Assembly
7	Transfer Case Control Actuator Lever Thrust Bearing Assembly
8	Transfer Case Control Actuator Lever Washer
9	Transfer Case Four Wheel Drive Clutch Pressure - Apply - Plate **Tip:** Ensure the control actuator lever washer is seated into the apply plate groove.
10	Transfer Case Four Wheel Drive Clutch Pressure Plate Spring (Qty: 4)
11	Transfer Case Four Wheel Drive Clutch Hub
12	Transfer Case Four Wheel Drive Clutch Shim **Tip:** • 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. • 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 **Tip:** If the clutch shim is not seated against the retaining ring, replace the clutch pressure plate springs.

Measuring/Adjusting Clutch Assembly Height

2008 Chevrolet Silverado 1500

2008 TRANSMISSION Transfer Case - MP 3023/3024-NQH - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

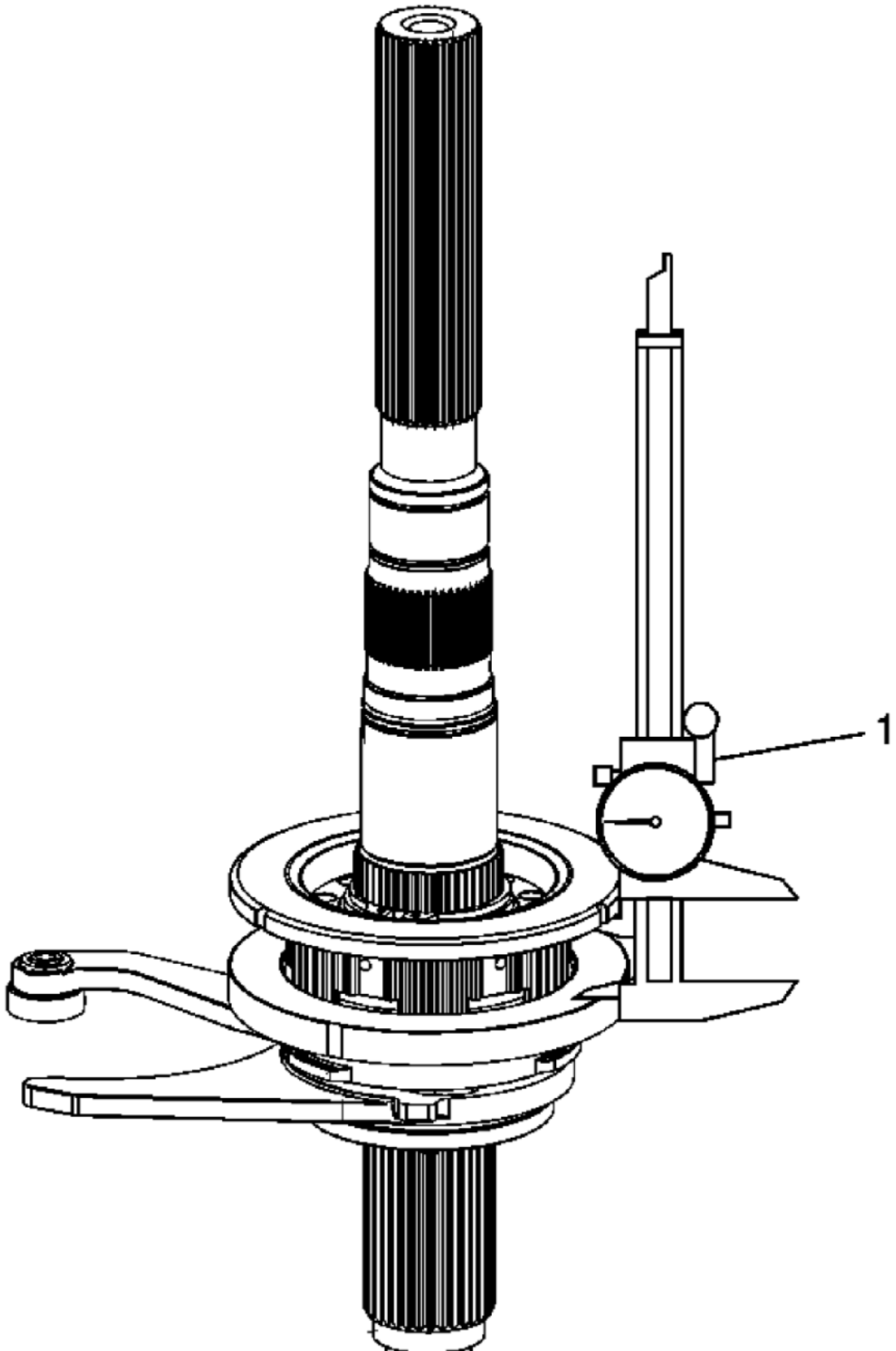


Fig. 49: Measuring/Adjusting Clutch Assembly Height
Courtesy of GENERAL MOTORS CORP.

Measuring/Adjusting Clutch Assembly Height

Callout	Component Name
Tip: • 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.	
1	Clutch Assembly **Procedure:** 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.

Clutch Pressure Plate Installation

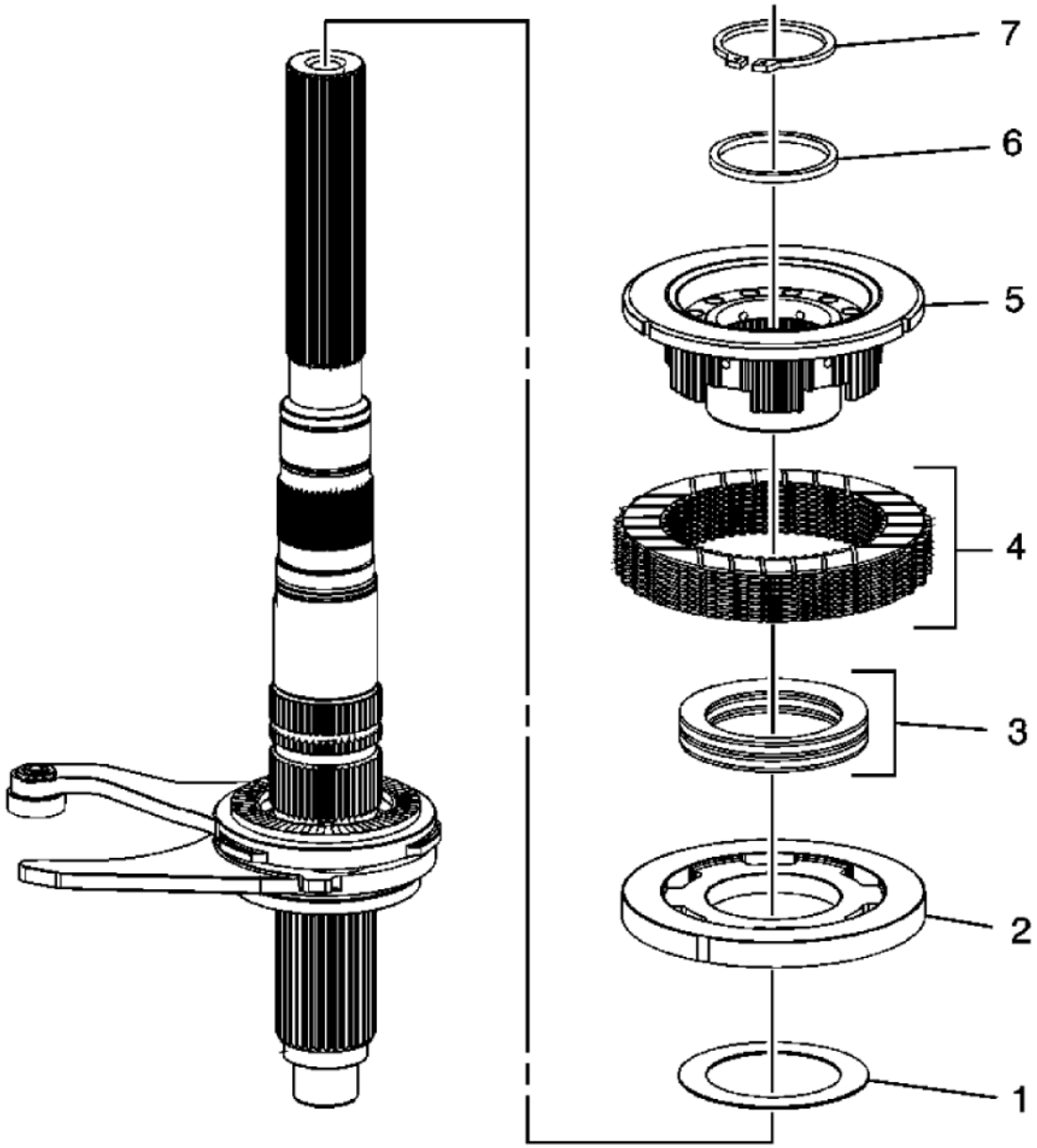


Fig. 50: Clutch Pressure Plate Installation
Courtesy of GENERAL MOTORS CORP.

Clutch Pressure Plate Installation

Callout	Component Name
1	Transfer Case Control Actuator Lever Washer
2	Transfer Case Four Wheel Drive Clutch Pressure - Apply - Plate
	Transfer Case Four Wheel Drive Clutch

3	Pressure Plate Spring (Qty: 4)
4	Transfer Case Four Wheel Drive Clutch Pressure Plates
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

Rear Output Shaft Assembly

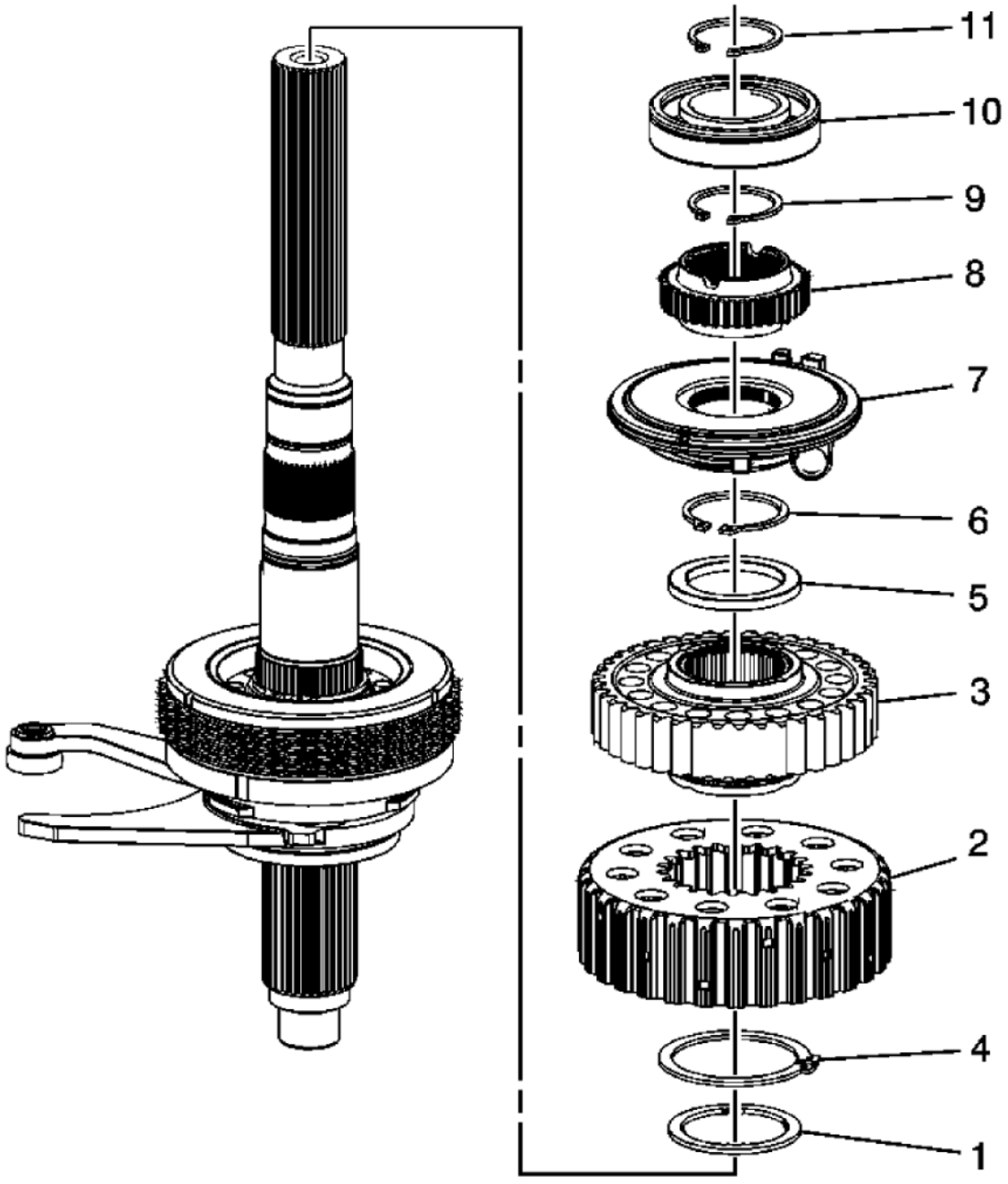


Fig. 51: Rear Output Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

Rear Output Shaft Assembly

Callout	Component Name
1	Transfer Case Front Output Shaft Drive 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 Drive Sprocket Spacer - Rear
6	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring
7	Transfer Case Oil Pump Assembly
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 Assembly **Tip:** • Use an arbor press or suitable installer to install the bearing to the rear output shaft. • Ensure the retaining ring groove in the outer race is positioned toward the rear.
11	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring

Shift Fork Assembly, and Rear Output Shaft Assembly Installation

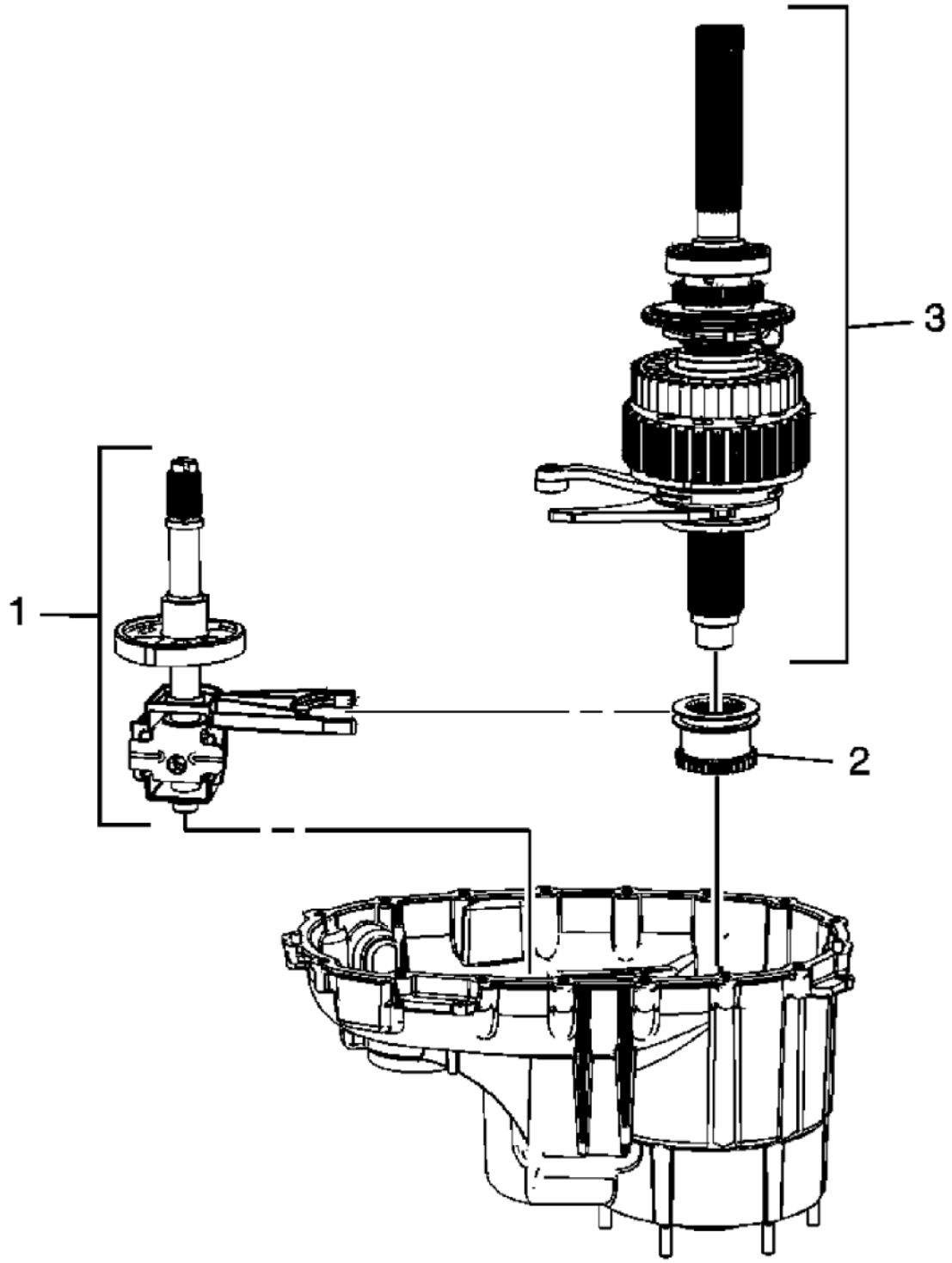


Fig. 52: Shift Fork Assembly, and Rear Output Shaft Assembly Installation
Courtesy of GENERAL MOTORS CORP.

Shift Fork Assembly, and Rear Output Shaft Assembly Installation

Callout	Component Name
Tip: Load all 3 components simultaneously.	
1	Transfer Case High/Low Shift Fork Assembly
2	Transfer Case High/Low Clutch
3	Transfer Case Rear Output Shaft Assembly

Front Output Shaft Assembly, Drive Chain, Actuator Shaft Gear, and Oil Pump Suction Pipe Installation

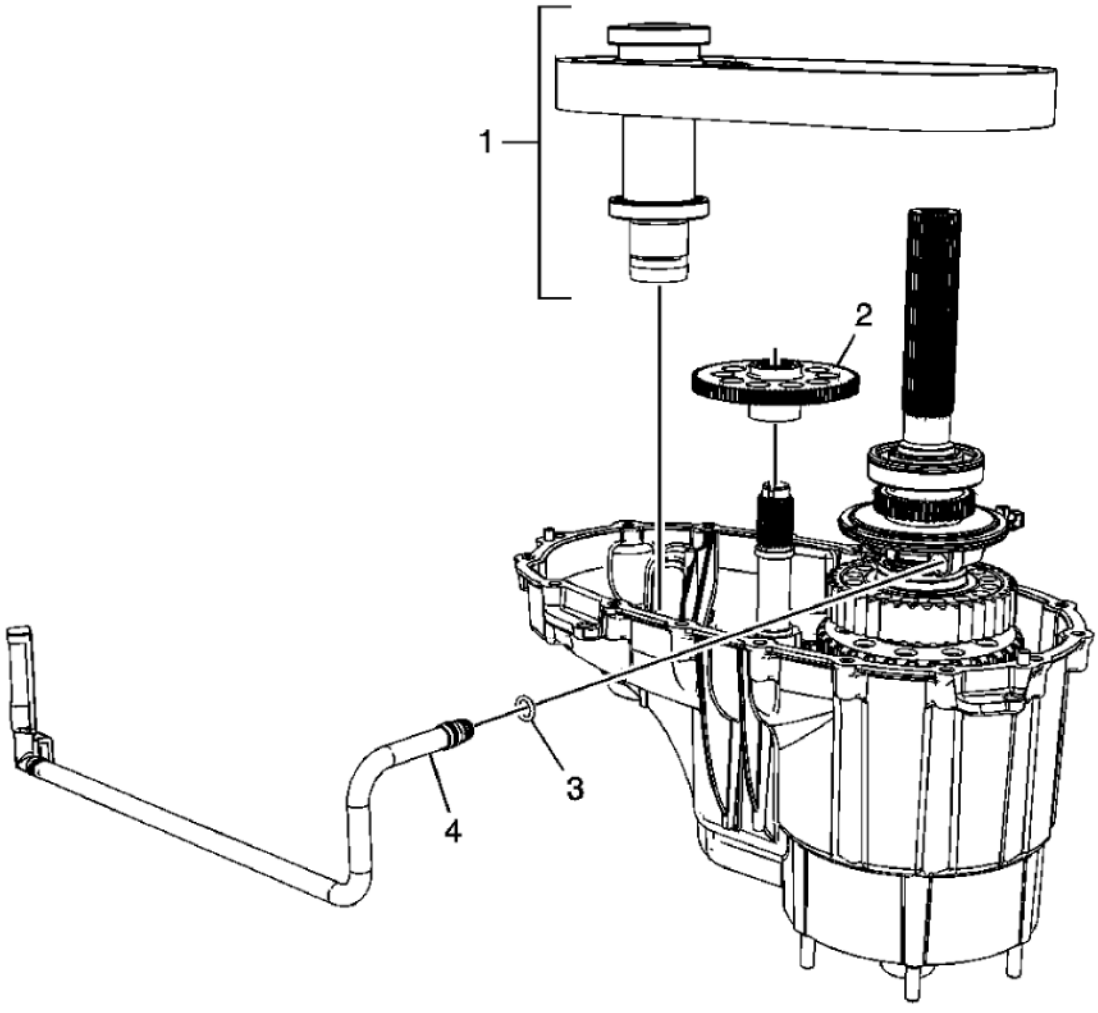


Fig. 53: View Of Front Output Shaft Assembly, Drive Chain, Actuator Shaft Gear, Oil Pump Suction Pipe & Seal
Courtesy of GENERAL MOTORS CORP.

Front Output Shaft Assembly, Drive Chain, Actuator Shaft Gear, and Oil Pump Suction

Pipe Installation

Callout	Component Name
1	Transfer Case Front Output Shaft Assembly, Transfer Case Front Output Shaft Drive Chain Assembly **Tip:** • Install the chain with darkened links up. • Install the front output shaft assembly into the front case half while engaging the chain with the drive sprocket.
2	Transfer Case Actuator Shaft Gear
3	Transfer Case Oil Pump Suction Pipe Seal **Tip:** • Use a NEW seal. • Lubricate the seal to ease installation. • Install the seal to the pipe prior to inserting the pipe into the pump.
4	Transfer Case Oil Pump Suction Pipe

Transfer Case Rear Case Half Installation

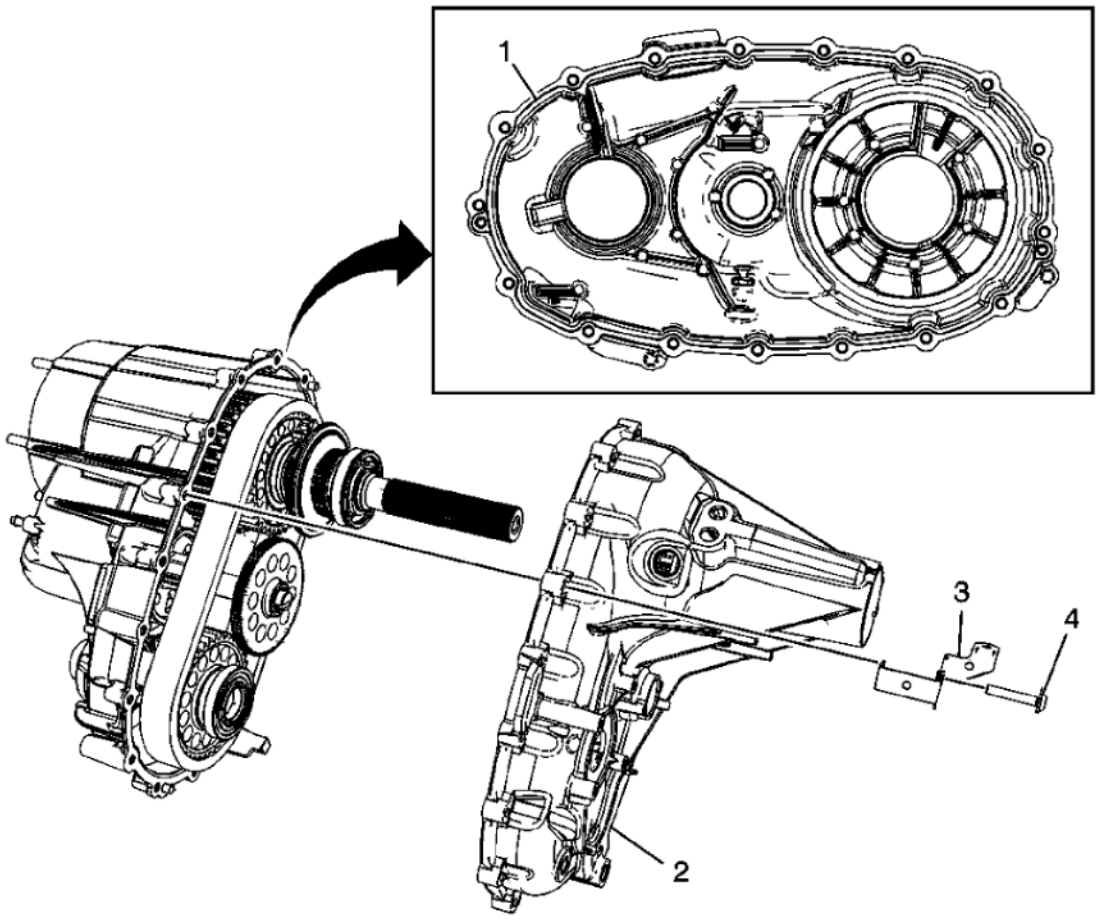


Fig. 54: View Of Transfer Case Rear Case Half, Bracket, Bolts & Sealer
Courtesy of GENERAL MOTORS CORP.

Transfer Case Rear Case Half Installation

Callout	Component Name
1	Sealer GM P/N 12345739 (Canadian P/N 10953541), or equivalent **NOTE:** **Apply the proper amount of sealant to the flange when assembling the transfer case. Excessive amounts of sealant can plug the oil pump screen, resulting in internal component failure.** **Tip:**

	• Ensure both sealing surfaces of the front and rear case halves are free of dirt, oil and cleaning solvent. • Apply a 2 mm (0.078 in) bead of sealant to the front case half.
2	Transfer Case Rear Case Half **Tip:** • Ensure the transfer case rear output shaft outer retaining ring is in place and aligned prior to mating case halves. • Use snap ring pliers to open the transfer case rear output shaft outer retaining ring for the transfer case rear output shaft rear bearing assembly. • Insert a rubber coated screwdriver into the speed sensor hole and lift up on the reluctor wheel to engage the retaining ring with the rear bearing assembly.
3	Transfer Case Bracket
4	Transfer Case Bolts (Qty: 17) **NOTE:** **Refer to Fastener Notice .** **Tip:** Tighten bolts by hand, do not use an air gun. **Tighten:** 25 N.m (18 lb ft)

Rear Output Shaft Seal and Bushing Installation

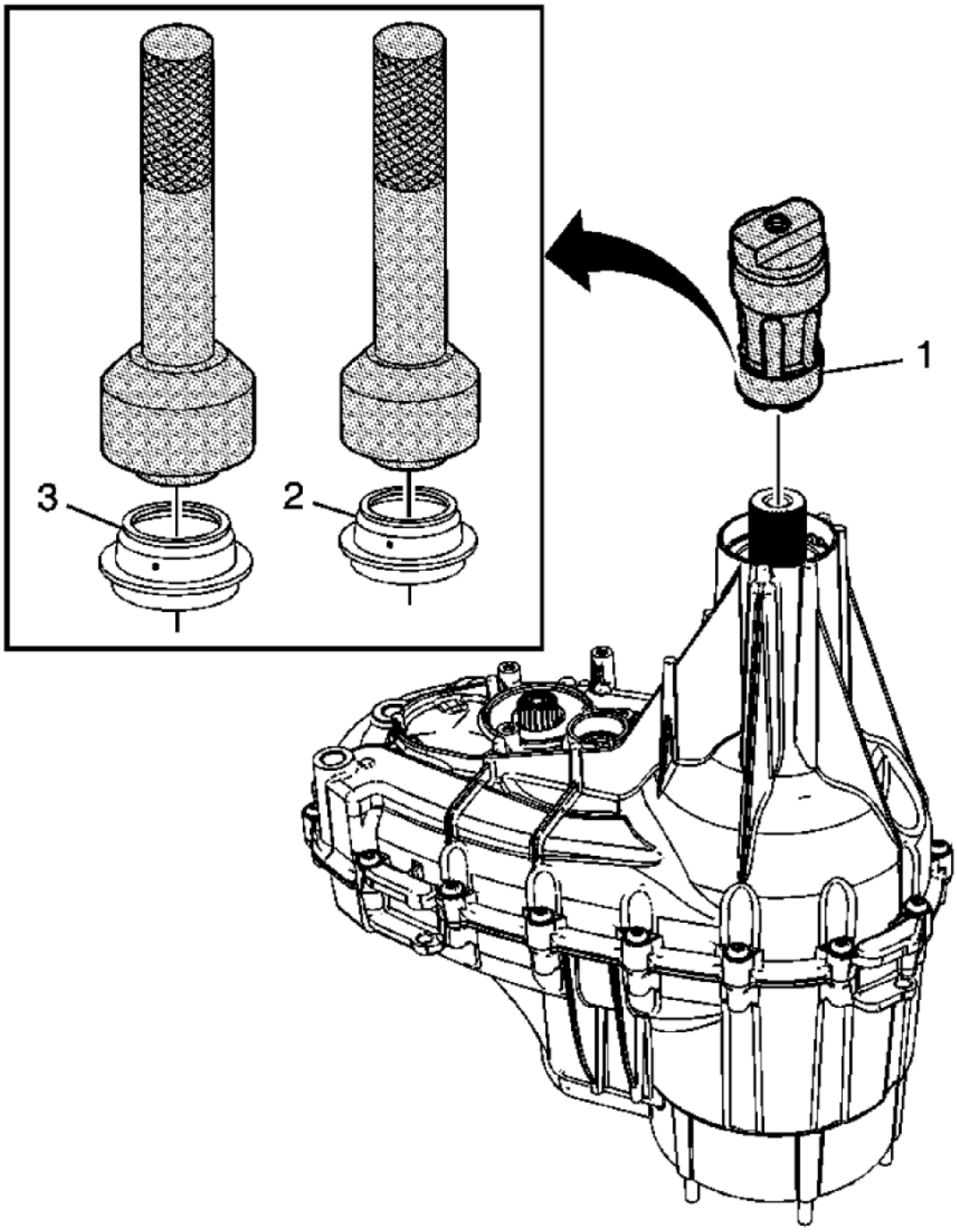


Fig. 55: View Of Rear Output Shaft Seal & Bushing
Courtesy of GENERAL MOTORS CORP.

Rear Output Shaft Seal and Bushing Installation

Callout	Component Name
1	Transfer Case Rear Output Shaft Bushing (Light Duty) **Tip:** • If the bushing was removed, a new bushing must be installed. • Ensure the bushing is installed squarely into the bushing bore. • Follow the steps below for use of the **J 45380** . 1. Install the bushing on the finger section of the **J 45380** . 2. Install the finger section to the main body of the **J 45380** . 3. Position the bushing and tool to the rear case half. 4. Press the bushing until the tool bottoms on the rear case half. **Special Tools:** **J 45380** Transfer Case Rear Bushing Remover and Installer
2	Transfer Case Rear Output Shaft Seal (Light Duty) **Tip:** Align the notch on the seal between the rear output bearing retaining ring access holes, this will position the weep hole down. **Special Tools** • **DT-48210** Seal Installer • **J 8092** Driver Handle
3	Transfer Case Rear Output Shaft Seal (Heavy Duty) **Tip:** Align the notch on the seal between the rear output bearing retaining ring access holes, this will position the weep hole down. **Special Tools**

	• **DT-48021** Seal Installer • **J 8092** Driver Handle

Access Hole Plugs, Fill and Drain Plug, Vent, 2/4 Wheel Drive Actuator, Actuator Shaft Position Sensor, and Vehicle Vehicle Speed Sensor Installation

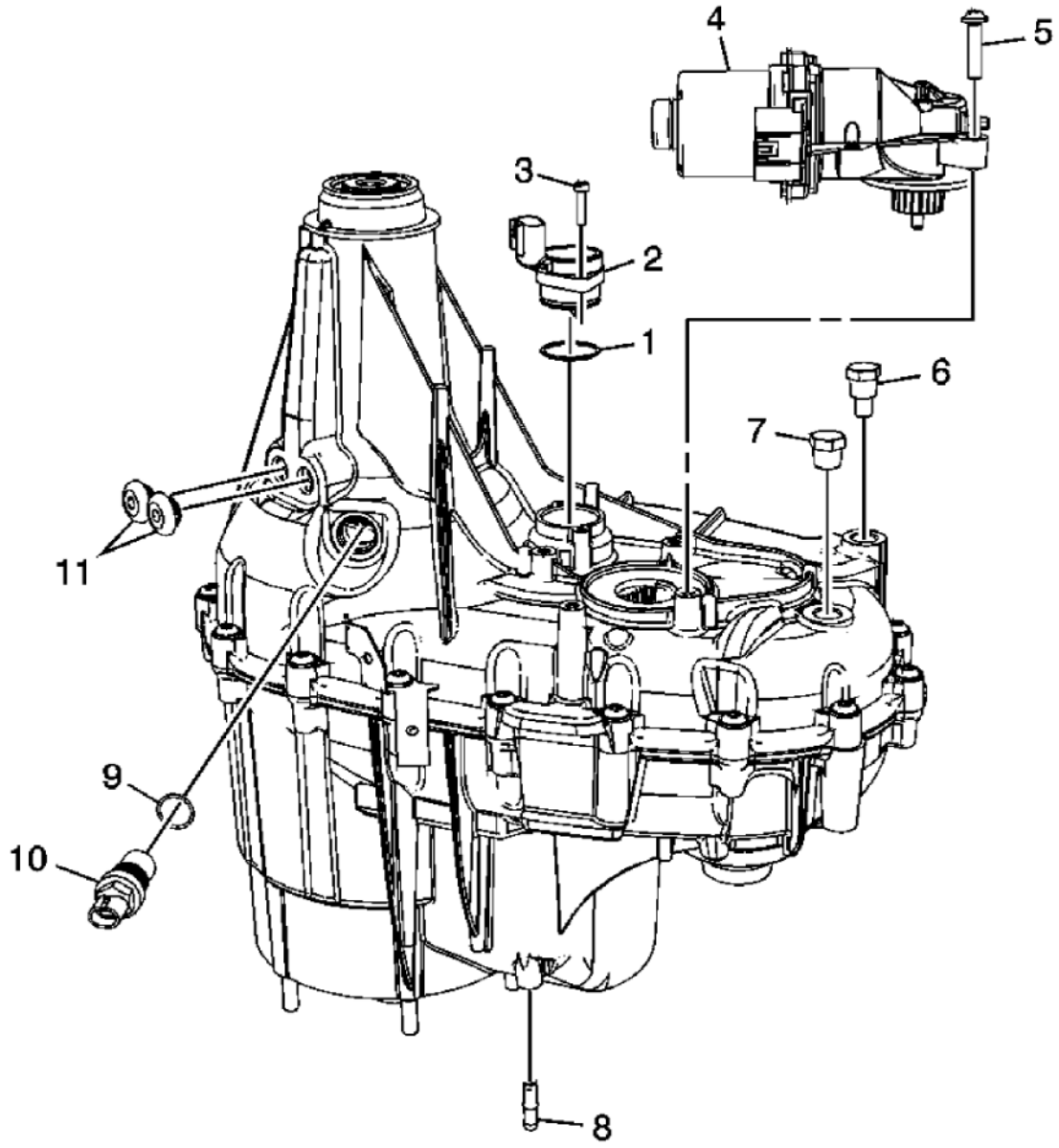


Fig. 56: View Of Access Hole Plugs, Fill & Drain Plug, Vent, 2/4 Wheel Drive Actuator, Actuator Shaft Position Sensor & Vehicle Speed Sensor
Courtesy of GENERAL MOTORS CORP.

Access Hole Plugs, Fill and Drain Plug, Vent, 2/4 Wheel Drive Actuator, Actuator Shaft Position Sensor, and Vehicle Speed Sensor Installation

Callout	Component Name
1	Transfer Case Actuator Shaft Position Sensor O-Ring Seal **Tip:** Lightly lubricate the O-ring with clean DEXRON®VI.
2	Transfer Case Actuator Shaft Position Sensor Assembly
3	Transfer Case Actuator Shaft Position Sensor Bolt/Screw **Tighten:** 9 N.m (80 lb in)
4	Transfer Case Two/Four Wheel Drive Actuator Assembly
5	Transfer Case Two/Four Wheel Drive Actuator Bolt/Screw **Tighten:** 18 N.m (13 lb ft)
6	Transfer Case Oil Drain Plug **NOTE:** **Refer to Component Fastener Tightening Notice .** **Tip:** Apply pipe sealant GM P/N 12346004 (Canadian P/N 10953480) to the oil drain plug before installation. **Tighten:** 18 N.m (13 lb ft)
7	Transfer Case Oil Fill Plug **Tip:** Apply pipe sealant GM P/N 12346004 (Canadian P/N 10953480) to the oil fill plug before installation. **Tighten:** 18 N.m (13 lb ft)
8	Transfer Case Vent **Tip:** Apply retaining compound GM P/N 12377901 (Canadian P/N 10953504) to the vent pipe before

	installation, if removed during disassembly.
9	Vehicle Speed Sensor O-Ring Seal **Tip:** Lightly lubricate the O-ring with clean DEXRON®VI.
10	Vehicle Speed Sensor Assembly **Tighten:** 17 N.m (13 lb ft)
11	Transfer Case Access Hole Plugs (Qty: 2)

Input Shaft Seal and Front Output Shaft Seal Installation

2008 Chevrolet Silverado 1500

2008 TRANSMISSION Transfer Case - MP 3023/3024-NQH - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

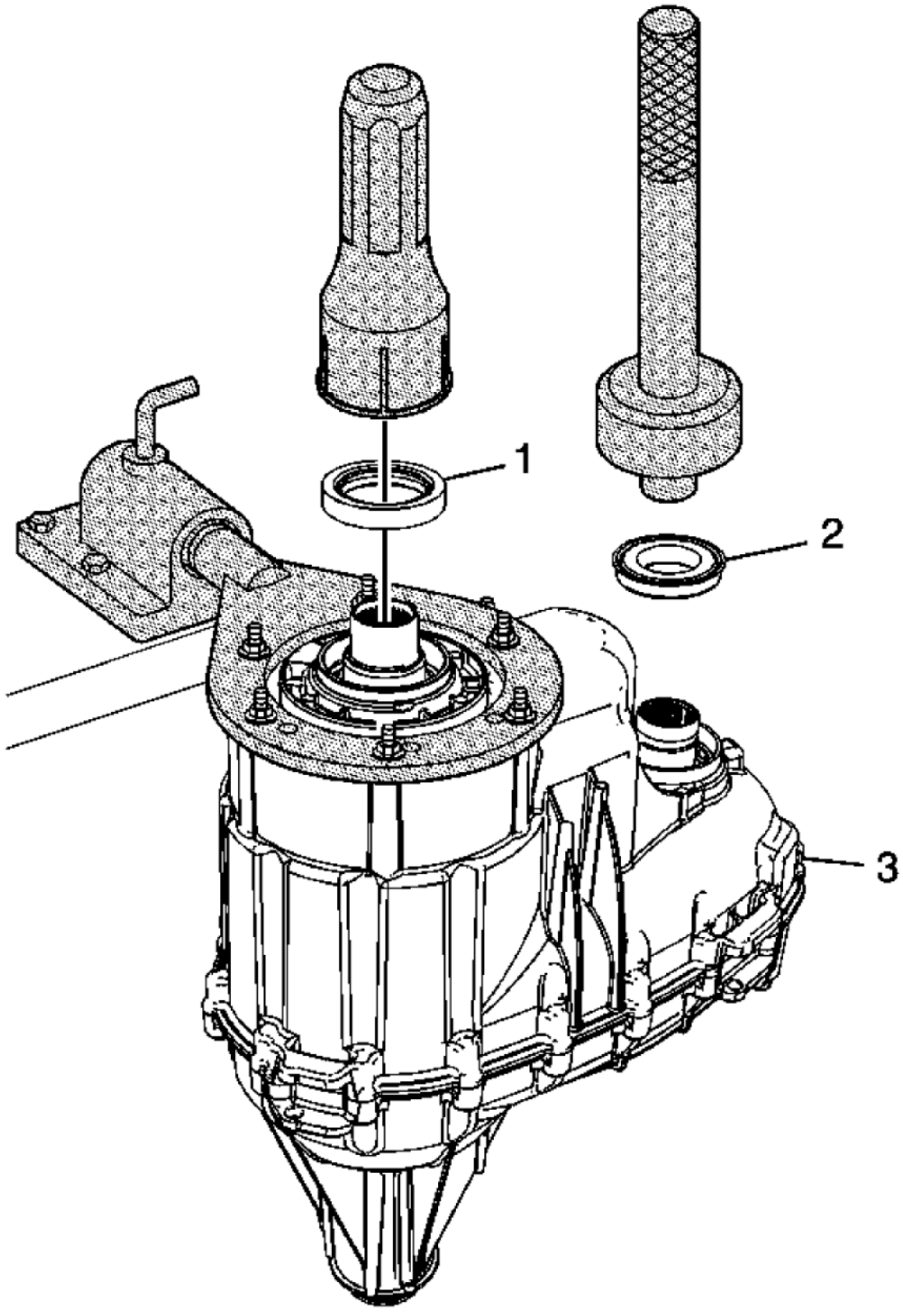


Fig. 57: View Of Transfer Case Assembly, Input Shaft Seal & Front Output Shaft Seal
Courtesy of GENERAL MOTORS CORP.

Input Shaft Seal and Front Output Shaft Seal Installation

Callout	Component Name
1	Transfer Case Input Shaft Seal **Tip:** Ensure the bore of the front case half is free of dirt, oil, and cleaning solvent. **Special Tools:** **J 42738** Seal Installer
2	Transfer Case Front Output Shaft Seal **Special Tools** • **J 8092** Driver Handle • **J 43484** Front Output Shaft Seal Installer
3	Transfer Case Assembly **Tip:** Remove from **J 3289-20** and remove the **J 45759** from the transfer case.

DESCRIPTION AND OPERATION

TRANSFER CASE IDENTIFICATION

TRANSFER CASE IDENTIFICATION (MAGNA)

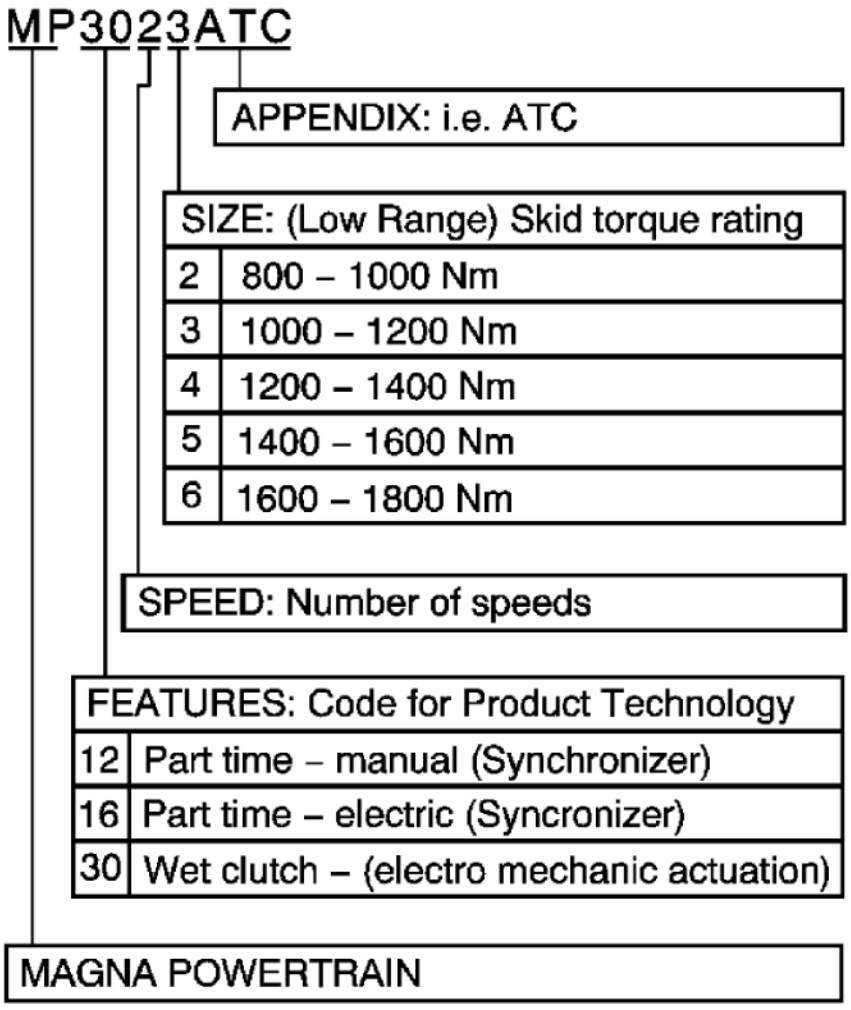


Fig. 58: Transfer Case I.D. Label
Courtesy of GENERAL MOTORS CORP.



Fig. 59: Magna Transfer Case Bar Code Label
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Component Identifier
2	GM Broadcast Code
3	Supplier Code
4	Production Year
5	Julian Date of the Year
6	Assembly Line Number
7	Sequential Number

TRANSFER CASE DESCRIPTION AND OPERATION

The Magna Powertrain (MP) model 3023/3024 RPO NQH transfer case is a 2 speed automatic, active transfer case (ATC). The MP 3023/3024 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. For example, the system is calibrated to provide 0-6.78 N.m (0-5 lb ft) of clutch torque during low speed, low engine torque operation, and predetermined higher torque for 40 km/h (25 mph) and greater. This prevents crow-hop and binding at low speeds and provides higher torque biases at higher vehicle speeds, in order to enhance stability.

Transfer Case Shift Control Switch

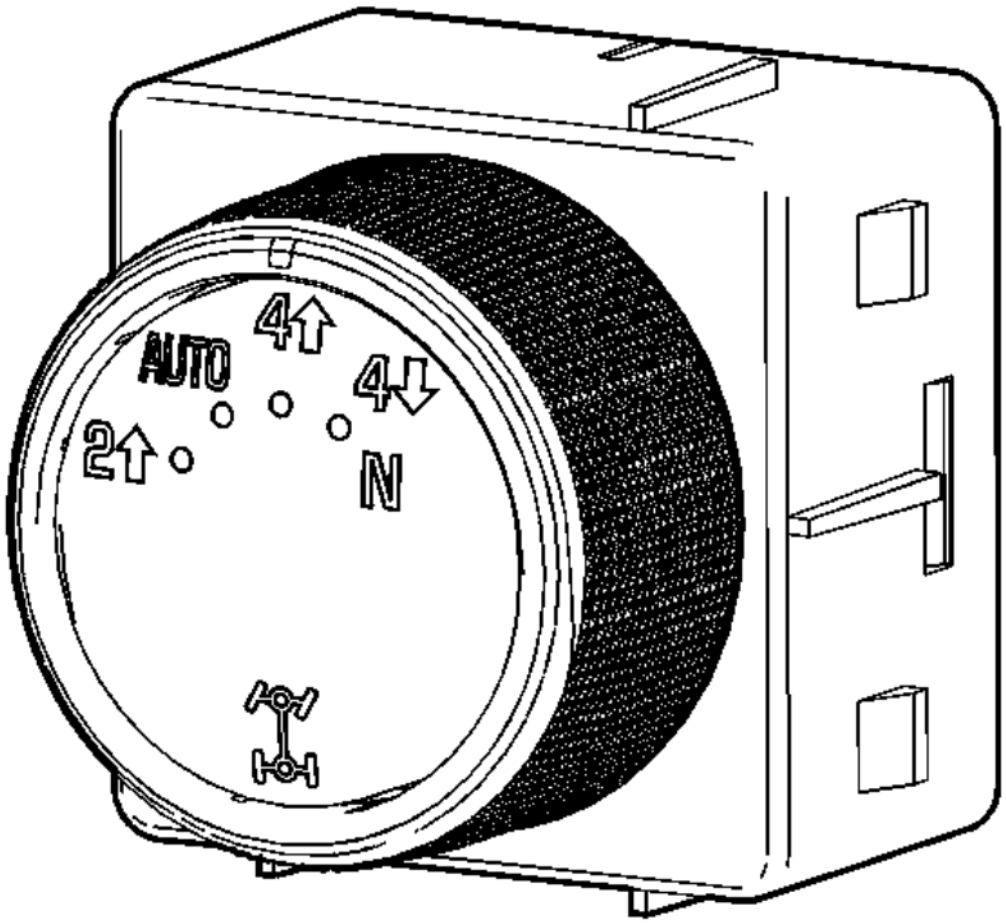


Fig. 60: Transfer Case Shift Control Switch
Courtesy of GENERAL MOTORS CORP.

The MP 3023/3024 ATC transfer case features a 4 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 single press 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. 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 sensors matches that of the rear speed sensors. Torque is ramped down to the front wheels. The process would repeat if rear wheel slip is detected again.

The MP 3023/3024 ATC transfer case 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, 2.68:1 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 has been met:

- The ignition switch is in RUN.
- The automatic transmission is in PARK or 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 has been met:

- The ignition switch is in RUN.
- The automatic transmission is in PARK or NEUTRAL.
- The vehicle speed is below 5 km/h (3 mph).
- The transfer case is in 2HI mode.

Once these conditions have been met, press and hold both the 2HI and 4LO buttons for 10

seconds. When the system completes the shift to NEUTRAL, the red NEUTRAL lamp will illuminate.

The NQH transfer case is available in 2 variations, depending on the engine and transmission configurations. The variations allow the transfer case to handle torque loads. When servicing the transfer case, it is important to understand which variation is being serviced because of the difference in parts.

MP 3023/3024 ATC Variations

Model	Transmission	Input Shaft	Output Shaft	Chain Size	Chain Series	Hi/Low Planetary	Application
MP 3023 ATC Light Duty (LD)	M30 - 4L60-E	27T Spline	32T Spline	7/16x1.25 in	9600 Series Rocker Pin Chain	3 Pinion	K1
MP 3023 ATC Light Duty (LD)	M99 - Hybrid	32T Spline	32T Spline	7/16x1.25 in	9600 Series Rocker Pin Chain	3 Pinion	K1
MP 3024 ATC Heavy Duty (HD)	MYD - 6L90	29T Spline	31T Spline	7/16x1.5 in	9600 Series Rocker Pin Chain	5 Pinion	K2

Additional differences in these models are listed below:

MP 3023 ATC with 27T Input Spline

- The high/low clutch has bias pointing engagement teeth. The leading edges of the teeth are not symmetric.
- The rear output shaft rear bearing retaining rings are larger than the MP 3023 ATC with 32T Input Spline but smaller than the MP 3024. The inner diameter of the ring groove at the rear output shaft measures 37.5 mm (1.476 in).
- The rear output shaft bearing assembly inner diameter measures 40 mm (1.575 in) the width measures 18 mm (0.709 in).
- The rear output shaft bearing assembly surface on the rear output shaft measures 40 mm

(1.575 in).

MP 3023 ATC with 32T Input Spline

- The high/low clutch has neutral pointing engagement teeth. The leading edges of the teeth are symmetric.
- The speed reluctor wheel profile thickness is thinner than the MP 3023 ATC with 27T input spline and the MP 3024, measuring 25.8 mm (1.016 in) thick.
- There is no snap ring between the speed reluctor wheel and the rear output shaft rear bearing assembly.
- There is no snap ring groove in the rear output shaft between the speed reluctor wheel and the rear output shaft rear bearing assembly.
- The rear output shaft rear bearing retaining ring is smaller than the MP 3023 ATC with 27T input spline and the MP 3024. The inner diameter of the ring groove at the rear output shaft measures 33 mm (1.299 in).
- The rear output shaft bearing assembly inner diameter measures 35 mm (1.378 in) the width measures 23 mm (0.906 in).
- The rear output shaft bearing assembly surface on the rear output shaft measures 35 mm (1.378 in).
- There is an additional harness bracket.

MP 3023 ATC, Common to LD

- The input shaft pilot bearing assembly is smaller than the MP 3024 ATC in order to accommodate the smaller rear output shaft. The outer diameter measures 38.1 mm (1.5 in).
- The rear output shaft is smaller than the MP 3024 ATC.
- The front output shaft drive sprocket is 27.2 mm (1.071 in) wide.
- The front output shaft driven sprocket is 29.4 mm (1.157 in) wide.
- The rear output shaft seal is smaller than the MP 3024 ATC. The inner lip diameter measures 46.1 mm (1.815 in).
- The rear output shaft bushing is smaller than the MP 3024 ATC. The inner diameter measures 48 mm (1.890 in).
- The rear case half has smaller bores than the MP 3024 ATC in order to accommodate the rear output shaft seal and the rear output shaft bushing.
- The control lever is thinner than the MP 3024 ATC, measuring 9.5 mm (0.374 in) between the bearing surfaces.
- The control actuator lever is thinner than the MP 3024 ATC, measuring 9.5 mm (0.374 in)

between the bearing surfaces.

- The control actuator lever balls are larger than the MP 3024 ATC, measuring 13 mm (0.512 in) in diameter.
- The control actuator lever washer is thinner than the MP 3024 ATC, measuring 1 mm (0.039 in).

MP 3024 ATC

- The input shaft pilot bearing assembly is larger than the MP 3023 ATC in order to accommodate the larger rear output shaft. The outer diameter measures 41.275 mm (1.625 in).
- An input shaft pilot bearing retaining ring is used.
- The high/low clutch has neutral pointing engagement teeth. The leading edges of the teeth are symmetric.
- The rear output shaft is larger than the MP 3023 ATC.
- The front output shaft drive sprocket is 33.5 mm (1.319 in) wide.
- The front output shaft driven sprocket is 35.5 mm (1.398 in) wide.
- The rear output shaft rear bearing retaining rings are larger than the MP 3023 ATC. The inner diameter of the ring groove at the rear output shaft measures 38.5 mm (1.516 in).
- The rear output shaft rear bearing assembly inner diameter measures 41 mm (1.614 in). The width measures 18 mm (0.709 in).
- The rear output shaft bearing assembly surface on the rear output shaft measures 41 mm (1.614 in).
- The rear output shaft seal is larger than the MP 3023 ATC. The inner lip diameter measures 53.8 mm (2.118 in).
- The rear output shaft bushing is larger than the MP 3023 ATC. The inner diameter measures 56.08 mm (2.208 in).
- The rear case half has larger bores than the MP 3023 ATC in order to accommodate the rear output shaft seal and the rear output shaft bushing.
- The control lever is thicker than the MP 3023 ATC, measuring 10.5 mm (0.413 in) between the bearing surfaces.
- The control actuator lever is thicker than the MP 3023 ATC, measuring 10.5 mm (0.413 in) between the bearing surfaces.
- The control actuator lever balls are smaller than the MP 3023 ATC, measuring 10 mm (0.394 in) in diameter.
- The control actuator lever washer is thicker than the MP 3023 ATC, measuring 2.5 mm

(0.098 in).

2WD Mode Power Flow

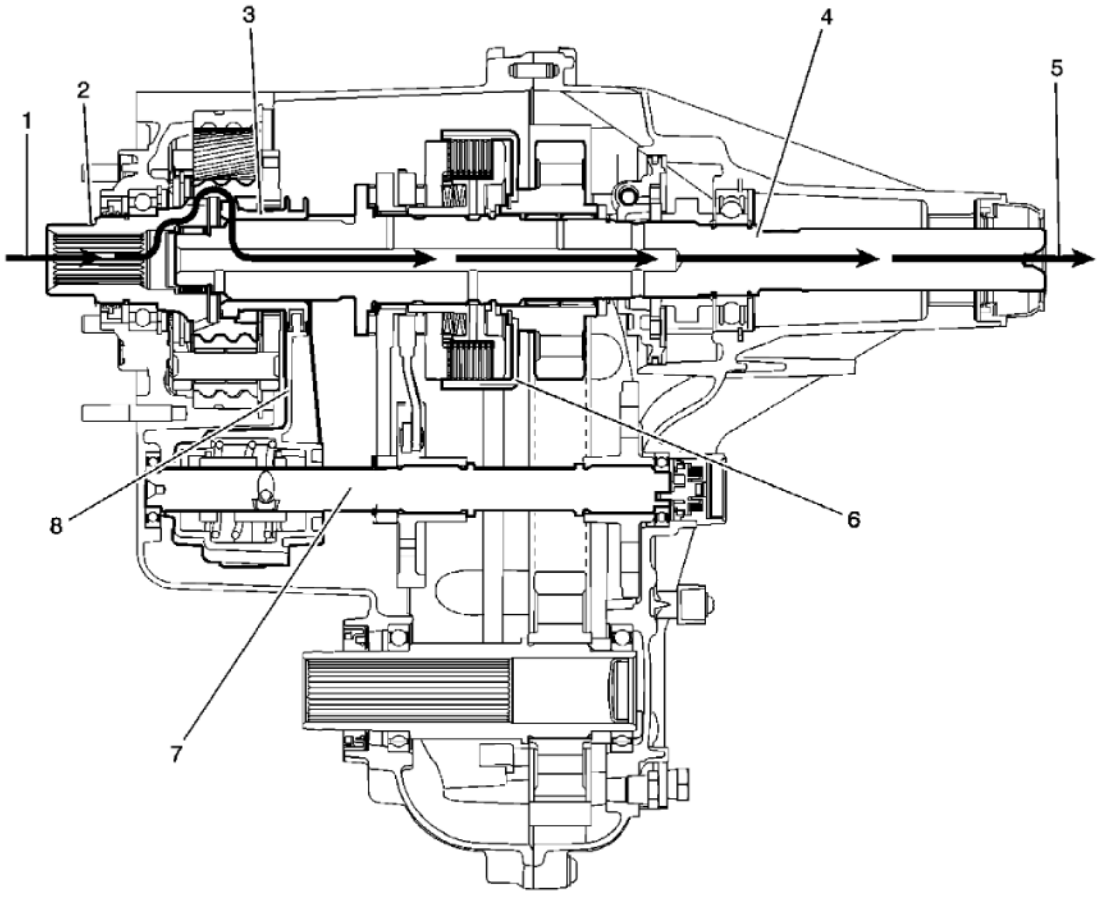


Fig. 61: 2WD Mode Power Flow
Courtesy of GENERAL MOTORS CORP.

When the MP 3023/3024 ATC 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

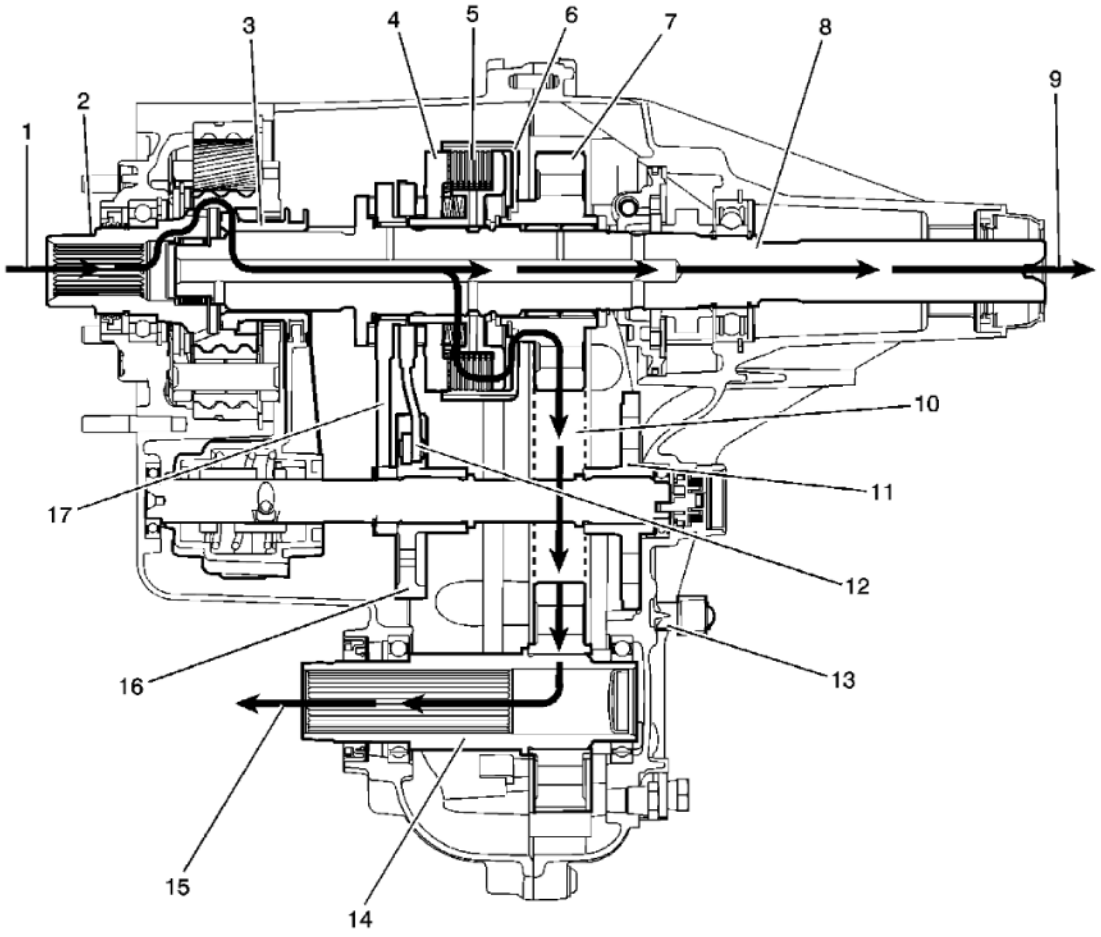


Fig. 62: 4HI Mode Power Flow
Courtesy of GENERAL MOTORS CORP.

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 control actuator lever (12). The control actuator 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 shaft (14). The power flow is delivered to the front propshaft (15) through the front output 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 modules command for more, or less clutch torque.

4LO Mode Power Flow

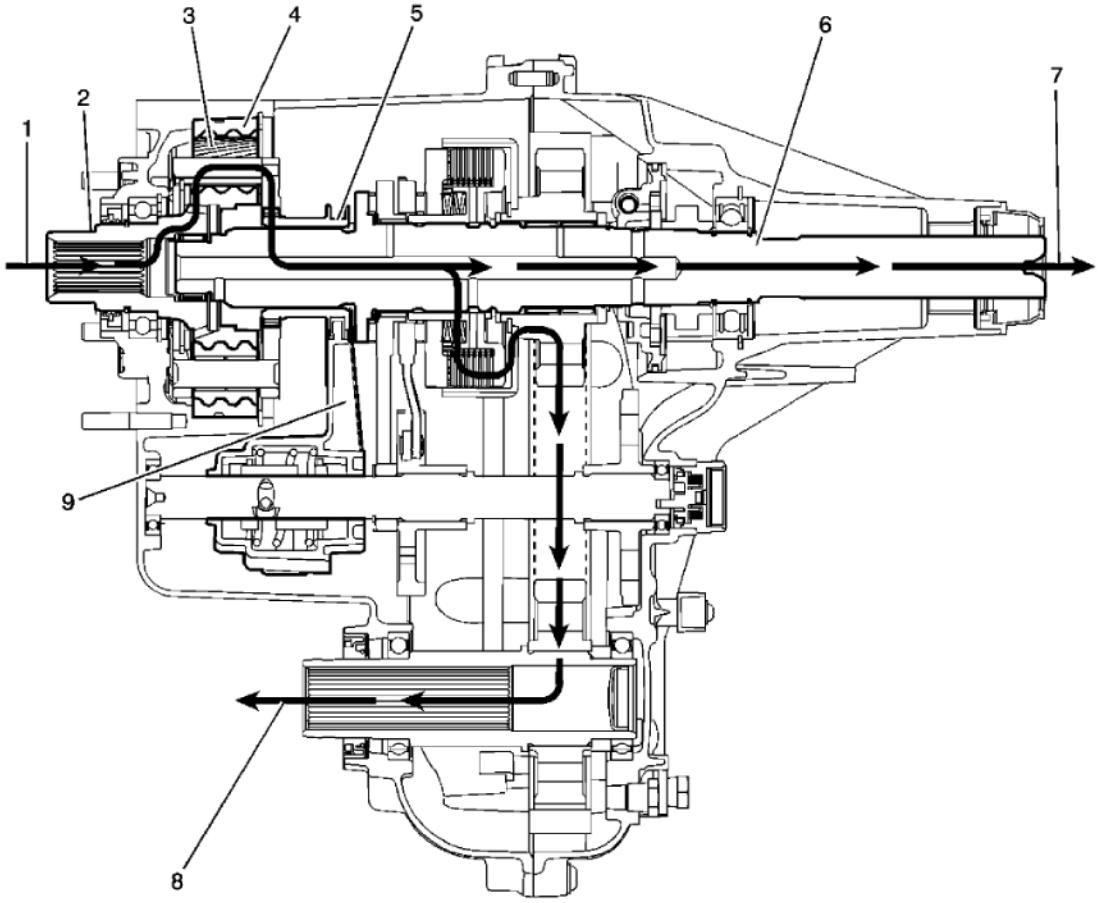


Fig. 63: 4LO Mode Power Flow
Courtesy of GENERAL MOTORS CORP.

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 2.68:1 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.

Service 4WD Indicator

The Service 4WD indicator is an integral part of the cluster and cannot be serviced separately. This lamp is used to inform the driver of the vehicle that a transfer case system malfunctioned. The Service 4WD indicator is controlled by the transfer case shift control module via Class 2.

Transfer Case Two/Four Wheel Drive Incremental Sensor

The incremental sensor is mounted to the transfer case actuator assembly and is replaced 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 Two/Four Wheel Drive Actuator Assembly

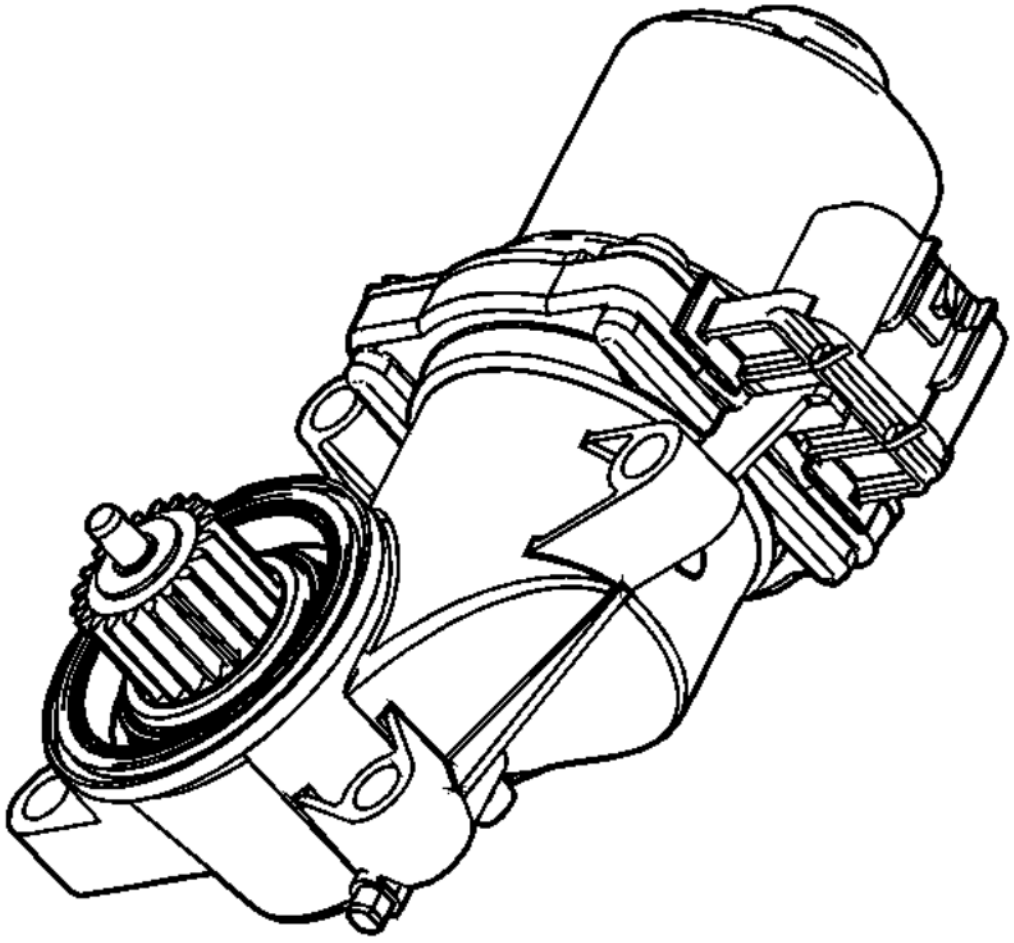


Fig. 64: Transfer Case Two/Four Wheel Drive Actuator Assembly
Courtesy of GENERAL MOTORS CORP.

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.

Transfer Case Actuator Shaft Position Sensor Assembly

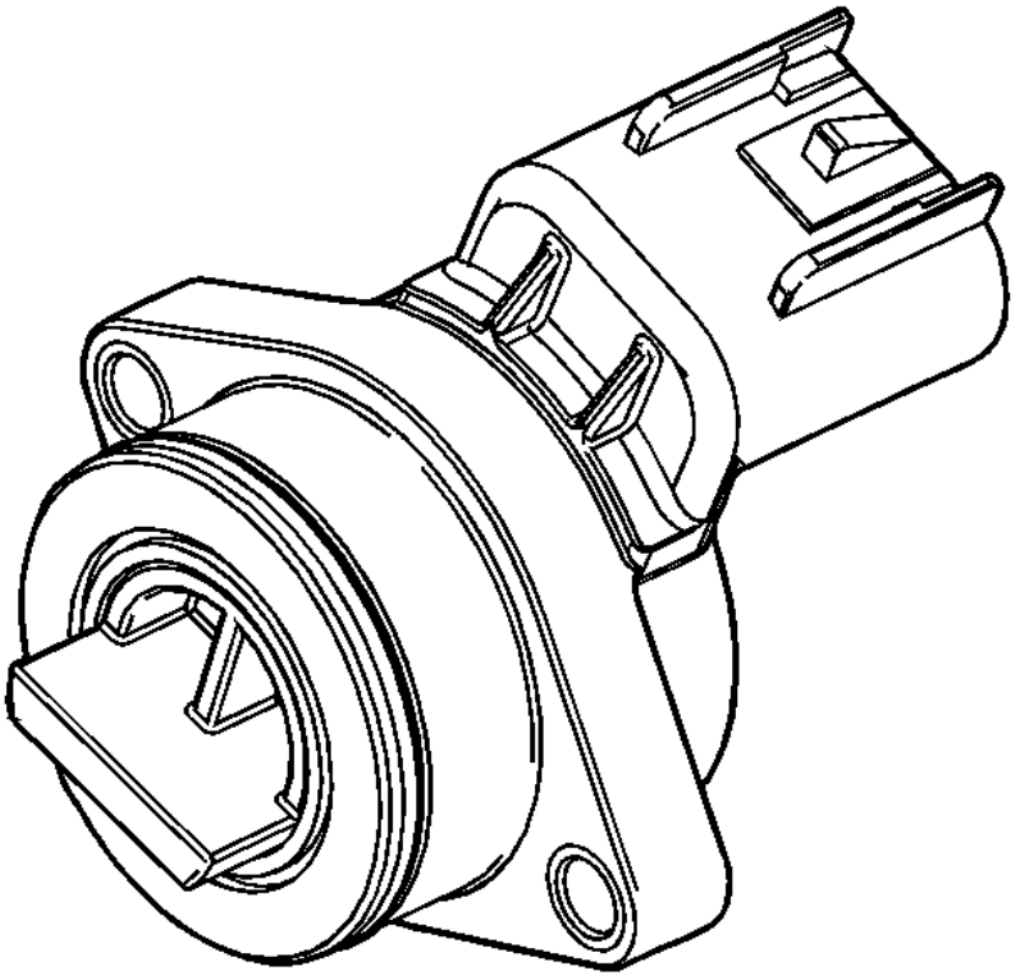


Fig. 65: Transfer Case Actuator Shaft Position Sensor Assembly
Courtesy of GENERAL MOTORS CORP.

This sensor works in conjunction with the incremental sensor and shows transfer case position in degrees.

Transfer Case Motor Lock

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 Shift Control Module

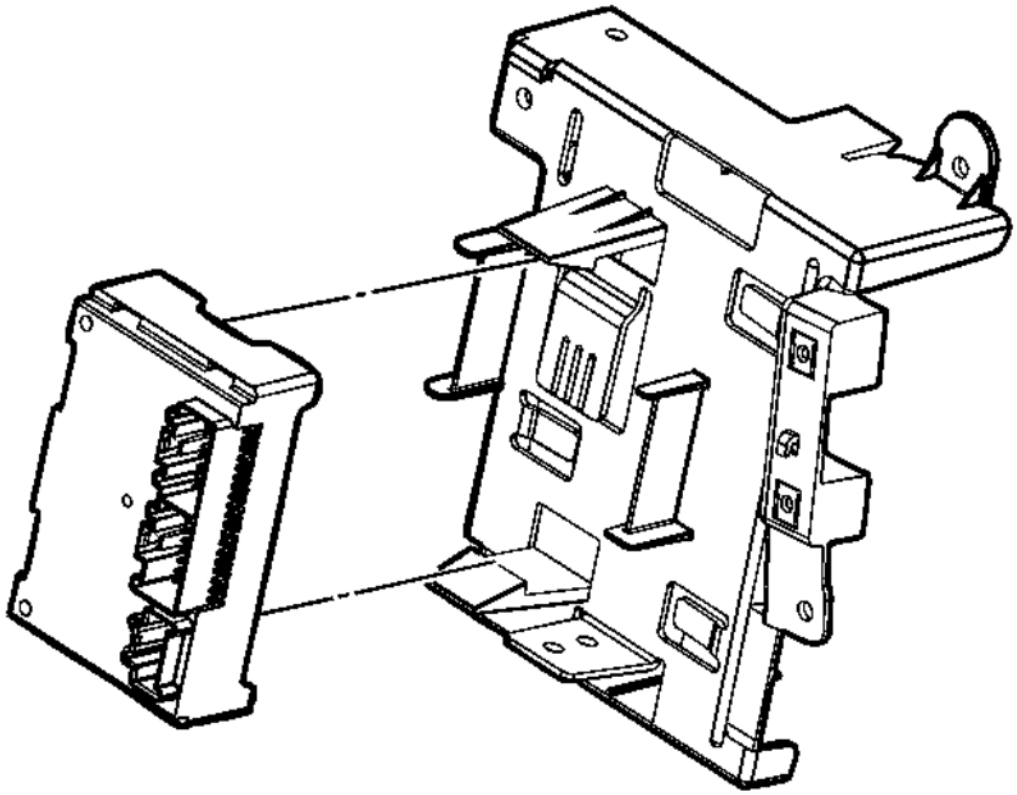


Fig. 66: Transfer Case Shift Control Module
Courtesy of GENERAL MOTORS CORP.

The transfer case shift control module uses the vehicle identification number (VIN) information for calculations that are required for the different calibrations used based on axle ratio, transmission, tire size, and engine. The system does not know which calibration to use without this information. When the vehicle is in the AUTO 4WD mode, the transfer case shift control module monitors the speed of the front and rear propshaft, in order to detect wheel slippage. When wheel slippage is detected, the module applies a clutch pack contained inside the transfer

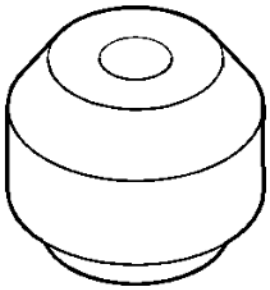
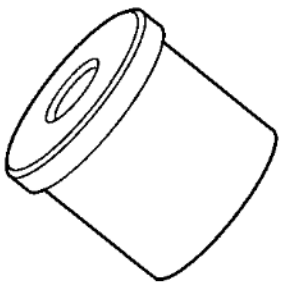
case. This clutch pack is used to lock-in and apply the front propshaft, transferring torque to the front wheels. The clutch pack is applied by a motor/encoder assembly. When slip is no longer detected by the transfer case shift control module, the clutch is no longer applied.

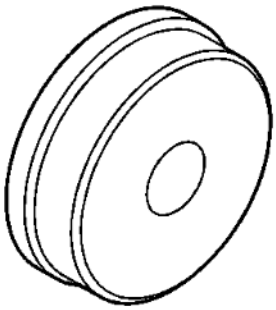
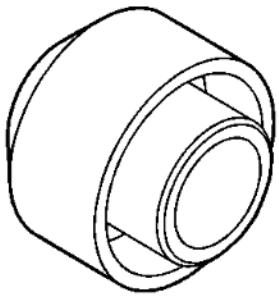
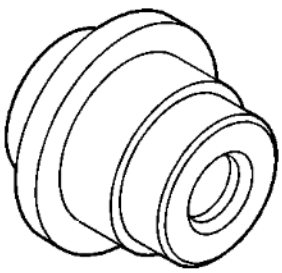
Vehicle Speed Sensor (VSS)

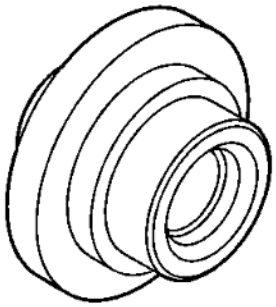
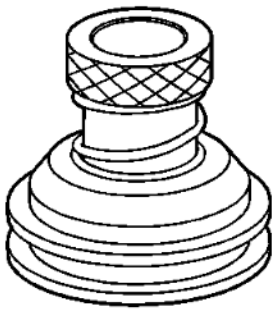
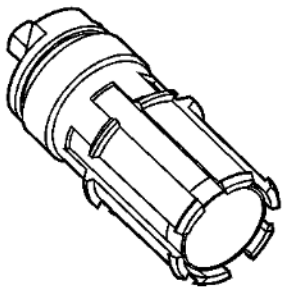
There is a VSS mounted to the transfer case on the rear output shaft. The VSS is a PM generator. The PM generator produces a AC voltage. The AC voltage and frequency increases as speed increases. The VSS is an input to the powertrain control module (PCM). The PCM sends this information to the transfer case shift control module via the GM LAN serial data bus.

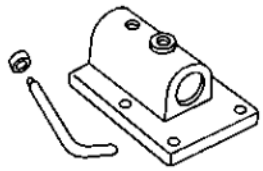
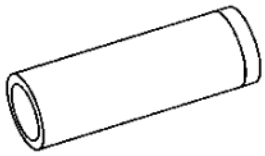
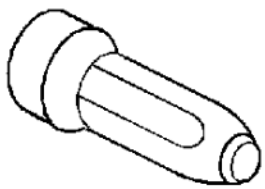
SPECIAL TOOLS AND EQUIPMENT

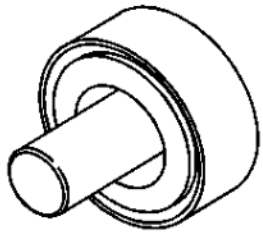
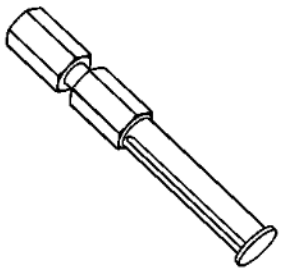
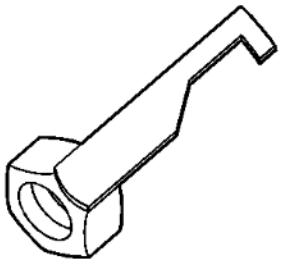
SPECIAL TOOLS

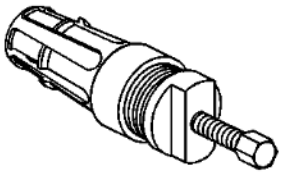
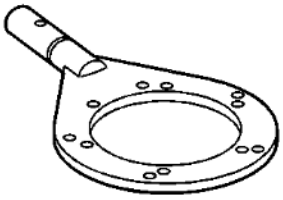
Illustration	Tool Number/Description
	DT-48021 Seal Installer
	DT-48022 Output Bushing Installer

	DT-48209 Bushing Remover
	DT-48210 Seal Installer
	DT-48211 Drive Sprocket Bearing Installer
	DT-48212 Input Shaft Pilot Bearing Installer

	
	DT-48213 Clutch Pack Height Gage
	DT-48734 Extension Housing Bushing Replacer
	J 2619-O1 Slide Hammer

	J 3289-20 Holding Fixture
	J 8092 Driver Handle
	J 35512 Inner Pinion Bearing Installer
	J 42738 Seal Installer
	J 43484 Front Output Shaft Seal Installer

	
	J 44737 Shift Rail Bearing Remover
	J 44907 Bearing Installer
	J 45278 Seal Remover

	J 45380 Transfer Case Rear Bushing Remover and Installer
	J 45759 Assembly Fixture