2008 TRANSMISSION

Transfer Case - MP 1222/1225/1226-NQG - 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 Bolts (Qty: 17)	25 N.m	18 lb ft
Transfer Case Control Lever Bolt/Screw	27 N.m	20 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 Detent Plunger Plug	20 N.m	15 lb ft
Transfer Case Shift Control Switch Assembly	27 N.m	20 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 Control Lever Bolt/Screw	Threadlock	12345382	10953489
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 Selector Switch - O-Ring -	Transfer Case Fluid	88861003	88861004

Seal			
Transfer Case Shift Detent Plunger Plug Seal	Transfer Case Fluid	88861003	88861004
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

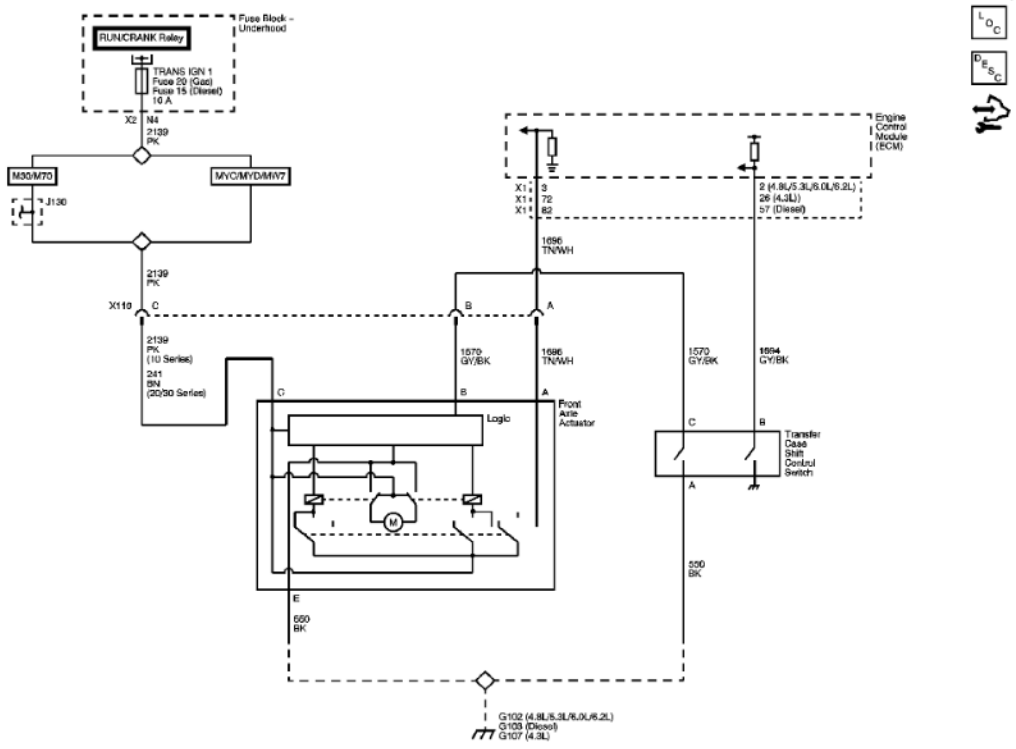


Fig. 1: Transfer Case Control Schematic
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

TRANSFER CASE DISASSEMBLED VIEW

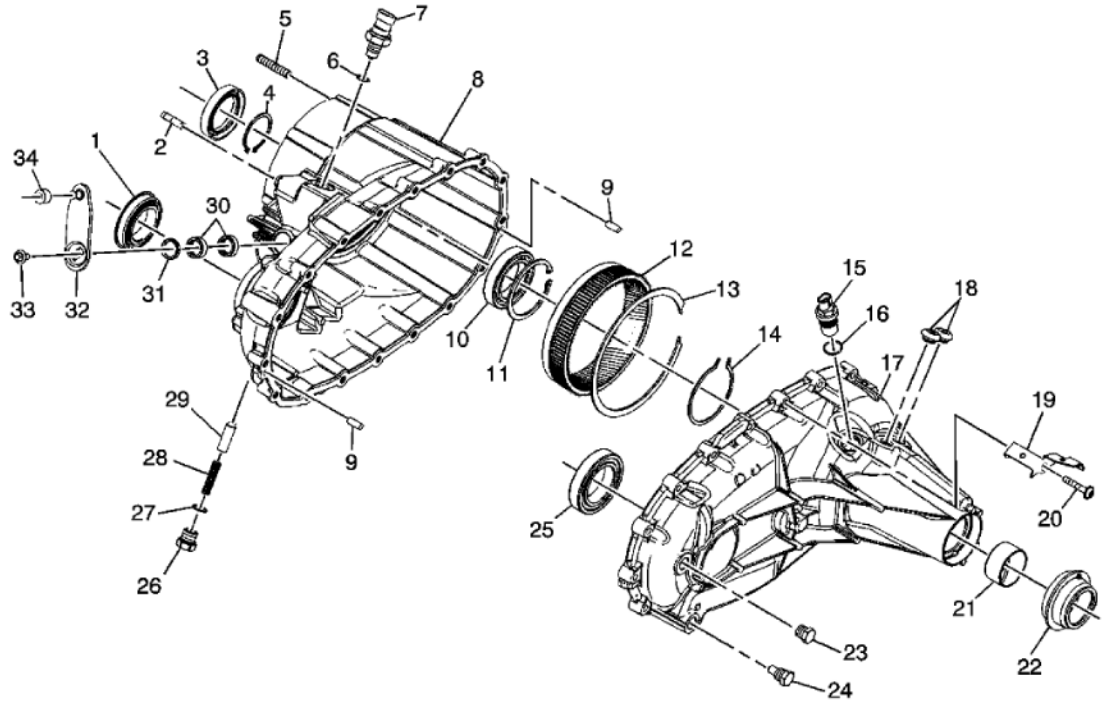


Fig. 2: Case Half Components
Courtesy of GENERAL MOTORS CORP.

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 Selector Switch - O-Ring - Seal
7	Transfer Case Shift Control Switch Assembly
8	Transfer Case Front Half
9	Transfer Case Half Locating Pin
9	Transfer Case Half Locating Pin
10	Transfer Case Input Shaft Bearing Assembly
11	Transfer Case Input Shaft Inner Retaining Ring
12	Transfer Case High/Low Internal Gear
13	Transfer Case High/Low Internal Gear Retaining Ring
14	Transfer Case Rear Output Shaft Rear Bearing Outer Retaining Ring

15	Vehicle Speed Sensor Assembly
16	Vehicle Speed Sensor - O-Ring - Seal
17	Transfer Case Rear Half
18	Transfer Case Access Hole Plug
19	Transfer Case - Harness - Bracket
20	Transfer Case Half Bolt/Screw (Qty: 17)
21	Transfer Case Rear Output Shaft Bushing
22	Transfer Case Rear Output Shaft Seal
23	Transfer Case Oil Fill Plug
24	Transfer Case Oil Drain Plug
25	Transfer Case Front Output Shaft Rear Bearing Assembly
26	Transfer Case Shift Detent Plunger Plug
27	Transfer Case Shift Detent Plunger Plug - O-Ring - Seal
28	Transfer Case Shift Detent Spring
29	Transfer Case Shift Detent Plunger
30	Transfer Case Shift Detent Lever Bearing Assembly
31	Transfer Case Shift Lever Seal
32	Transfer Case Shift Lever
33	Transfer Case Control Lever Bolt/Screw
34	Transfer Case Shift Lever - Rubber - Seal

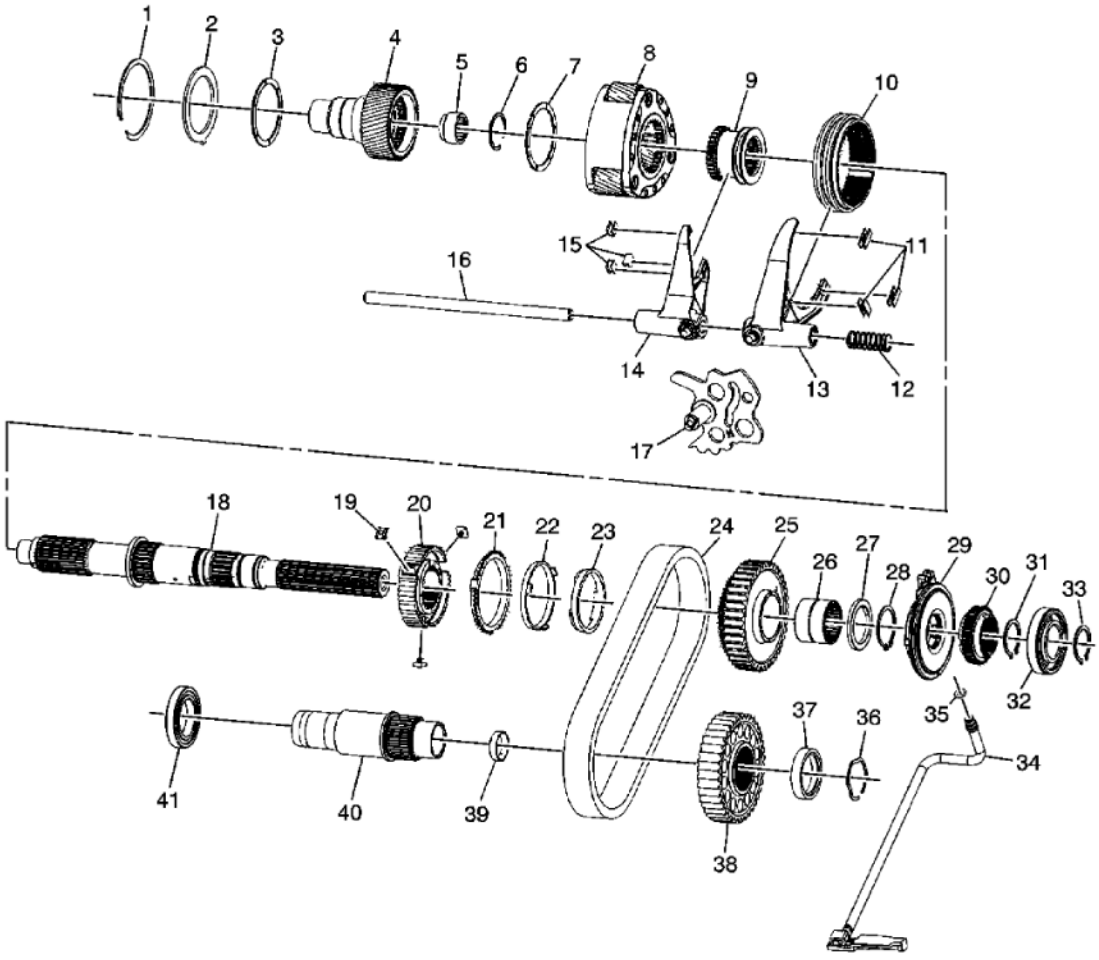


Fig. 3: Internal Components
Courtesy of GENERAL MOTORS CORP.

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 and SHD 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 Two/Four Wheel Drive Synchronizer Sleeve
11	Transfer Case Two/Four Wheel Drive Shift Fork Inserts
12	Transfer Case Shift Fork Spring
13	Transfer Case Two/Four Wheel Drive Shift Fork Assembly
14	Transfer Case High/Low Shift Fork
15	Transfer Case High/Low Shift Fork Inserts
16	Transfer Case Control Actuator Shaft
17	Transfer Case Shift Detent Lever Assembly
18	Transfer Case Rear Output Shaft
19	Transfer Case Two/Four Wheel Drive Synchronizer Inserts
20	Transfer Case Two/Four Wheel Drive Synchronizer Hub
21	Transfer Case Two/Four Wheel Drive Synchronizer Assembly
22	Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring - Outer
23	Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring - Inner
24	Transfer Case Front Output Shaft Drive Chain Assembly
25	Transfer Case Front Output Shaft Drive Sprocket
26	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly
27	Transfer Case Front Output Shaft Drive Sprocket Spacer - Rear
28	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring
29	Transfer Case Oil Pump Assembly
30	Transfer Case Rear Output Shaft Speed Reluctor Wheel
31	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
32	Transfer Case Rear Output Shaft Rear Bearing Assembly
33	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
34	Transfer Case Oil Pump Suction Pipe
35	Transfer Case Oil Pump Suction Pipe Seal
36	Transfer Case Front Output Shaft Driven Sprocket Spacer Spring
37	Transfer Case Front Output Shaft Driven Sprocket Spacer
38	Transfer Case Front Output Shaft Driven Sprocket
39	Transfer Case Front Output Shaft Hole Plug
40	Transfer Case Front Output Shaft
41	Transfer Case Front Output Shaft Front Bearing Assembly

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
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.

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: 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 manual selectable 4-wheel drive system. Refer to **Checking Aftermarket Accessories** .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Ensure all mechanical components are operative before diagnosing the electrical portion of the system.
- In order to determine whether the vehicle is in 2-wheel drive (2WD) or 4-wheel drive (4WD), lift the vehicle so the wheels can spin freely. With the transfer case control lever in 2HI, turn the rear propeller shaft. If the front propeller shaft does not move with the rear, the vehicle is in 2HI. If the tires and the front propeller shaft moves, the transfer case is in 4WD.
- Ensure the 4WD fuse is not open. If the fuse is open, locate and repair the source of the overload. Refer to **Testing for Short to Ground** . Replace the fuse.

Intermittent

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

Symptom List

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

- **Four-Wheel Drive Does Not Disengage**
- **Four-Wheel Drive Does Not Engage**
- **Four-Wheel Drive Indicator Always On**
- **Four-Wheel Drive Indicator Inoperative**
- **Transfer Case Popping Noise**
- **Transfer Case Whine or Rumble Noise**
- **Transfer Case Growl or Grinding Noise**
- **Transfer Case Clunk in 2HI Only**
- **Transfer Case Clunk in 4HI**
- **Transfer Case Clunk in 4LO**
- **Transfer Case Will Not Shift**
- **Transfer Case Jumps Out of Gear**
- **Transfer Case Leak Diagnosis**

FOUR-WHEEL DRIVE DOES 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 consists of the following components within the actuator assembly:

- A permanent magnetic motor
- A worm gear controlled plunger
- A front axle switch
- An electronic control circuit

The front axle actuator consists of the following circuits:

- An ignition 3 voltage circuit
- A ground circuit
- An axle actuator control circuit
- An axle switch signal circuit

Whenever a shift to 4WD is selected, the transfer case switch engages the front axle by grounding the axle actuator 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**

Circuit/System Verification

1. Place the vehicle in 2WD install a scan tool and using engine data 2 look at the display for 4WD signal.
2. Verify that the scan tool indicates that the vehicle is in 2WD.
    - If the scan tool indicates that the vehicle is in 4WD go to circuit system testing.

Circuit/System Testing

1. Check the axle switch signal circuit for a short to voltage.
    - If everything checks normal then go to the next step.
2. Check the front axle actuator control circuit for a short to ground with the front axle actuator disconnected and the mode selection switch disconnected.
    - If everything checks normal reconnect the mode selection switch and retest. If the circuit shows a short to ground then replace the switch. If the circuit indicates no short to ground then refer to front axle actuator and axle testing.

Front Axle Actuator and Axle Testing

Remove the actuator and attempt shift from 2WD to 4WD, if the actuator moves check the front axle actuator plunger and fork assembly.

- If the actuator does not function properly then replace the front axle actuator.

Repair Procedures

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

- **Front Drive Axle Actuator Replacement**
- Transfer Case Gear Indicator Switch Replacement
- **Front Drive Axle Clutch Fork Inspection**

FOUR-WHEEL DRIVE DOES 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 consists of the following components within the actuator assembly:

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- A front axle switch
- An electronic control circuit

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- An ignition 3 voltage circuit
- A ground circuit
- An axle actuator control circuit
- An axle switch signal circuit

Whenever a shift to 4WD is selected, the transfer case switch engages the front axle by grounding the axle actuator 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**

Circuit/System Verification

1. Place the vehicle in 4WD install a scan tool and using engine data 2 look at the display for 4WD signal.
2. Verify that the scan tool indicates that the vehicle is in 4WD.
    - If the scan tool indicates that the vehicle is in 2WD go to circuit system testing.

Circuit/System Testing

1. Check the axle switch signal circuit for an open or high resistance.
    - If everything checks normal then go to the next step.
2. Check the front axle actuator control circuit for an open or high resistance with the front axle actuator disconnected and the mode selection switch disconnected.
    - If everything checks normal reconnect the mode selection switch and retest. If the circuit still shows an open or high resistance then replace the switch. If the circuit indicates no open or high resistance then refer to front axle actuator and axle testing.

Front Axle Actuator and Axle Testing

Remove the actuator and attempt shift from 2WD to 4WD, if the actuator moves check the front axle actuator plunger and fork assembly.

- If the actuator does not function properly then replace the front axle actuator.

Repair Procedures

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

- **Front Drive Axle Actuator Replacement**
- Transfer Case Gear Indicator Switch Replacement
- **Front Drive Axle Clutch Fork Inspection**

FOUR-WHEEL DRIVE 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

The 4WD indicator lamp is located in the instrument cluster. Ignition 3 voltage is supplied to the instrument panel cluster (IPC) when the ignition switch is in the START or RUN position. When the vehicle is in START or RUN and the Engine control module (ECM) receives the axle switch signal from the front axle actuator, the ECM sends a CAN signal to the instrument cluster turning on the 4WD indicator. The 4WD indicator will stay on as long as the axle switch signal input is present.

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**

Circuit/System Verification

1. Place the vehicle in 2WD install a scan tool and using engine data 2 look at the display for 2WD signal.
2. Verify that the scan tool indicates that the vehicle is in 2WD.
    - If the scan tool indicates that the vehicle is in 4WD go to circuit system testing.

Circuit/System Testing

1. Check the axle switch signal circuit for a short to voltage.
    - If everything checks normal then go to the next step.

2. Check the front axle actuator control circuit pin B at the front axle actuator connector or pin C at the transfer case shift control switch for a short to ground.
    - If everything checks normal then short the axle actuator control circuit to ground this should cause the actuator to engage. Remove the short to ground and then short the circuit to ground again, this should cause the actuator to disengage. If the actuator does not operate properly then refer to front axle will not engage or front axle will not disengage. If everything checks normal go to ECM and IPC functionality check.

Instrument Panel Cluster (IPC) and Engine Control Module (ECM) Functionality

If all circuits referenced above check good use the scan tool under engine data 2 to see if the scan tool still indicates the vehicle is still in 4WD.

- If the scan tool indicates the vehicle is in 4WD then replace the engine control module, if not then replace the IPC.

Repair Procedures

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

- **Instrument Cluster Replacement (without RPO SLT)**
- **Engine Control Module Replacement** for the 4.3L engine
- **Engine Control Module Replacement** for the 4.8L, 5.3L, 6.0L, and 6.2L engine
- **Engine Control Module Replacement** for the 6.6L engine
- **Control Module References** for ECM replacement, setup, and programming
- **Four-Wheel Drive Does Not Disengage**
- **Four-Wheel Drive Does Not Engage**

FOUR-WHEEL DRIVE INDICATOR 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 4WD indicator lamp is located in the instrument cluster. Ignition 3 voltage is supplied to the instrument panel cluster (IPC) when the ignition switch is in the START or RUN position. When

the vehicle is in START or RUN and the Engine control module (ECM) receives the axle switch signal from the front axle actuator, the ECM sends a CAN signal to the instrument cluster turning on the 4WD indicator. The 4WD indicator will stay on as long as the axle switch signal input is present.

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**

Circuit/System Verification

1. Place the vehicle in 4WD install a scan tool and using engine data 2 look at the display for 4WD signal.
2. Verify that the scan tool indicates that the vehicle is in 4WD.
    - If the scan tool indicates that the vehicle is in 2WD go to circuit system testing.

Circuit/System Testing

1. Check the axle switch signal circuit for an open or high resistance.
    - If everything checks normal then go to the next step.
2. Check the front axle actuator control circuit pin B at the front axle actuator connector or pin C at the transfer case shift control switch for an open or high resistance.
    - If everything checks normal then short the axle actuator control circuit to ground this should cause the actuator to engage. Remove the short to ground and then short the circuit to ground again, this should cause the actuator to disengage. If the actuator does not operate properly then refer to front axle will not engage or front axle will not disengage. If everything checks normal go to ECM and IPC functionality check.

Instrument Panel Cluster (IPC) and Engine Control Module (ECM) Functionality

If all circuits referenced above check good use the scan tool under engine data 2 to see if the scan tool still indicates the vehicle is still in 2WD.

- If the scan tool indicates the vehicle is in 2WD then replace the engine control module, if not then replace the IPC.

Repair Procedures

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

- **Instrument Cluster Replacement (without RPO SLT)**
- **Engine Control Module Replacement** for the 4.3L engine
- **Engine Control Module Replacement** for the 4.8L, 5.3L, 6.0L, and 6.2L engine
- **Engine Control Module Replacement** for the 6.6L engine
- **Control Module References** for ECM replacement, setup, and programming
- **Four-Wheel Drive Does Not Disengage**
- **Four-Wheel Drive Does Not Engage**

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

Input shaft	• Excessive wear • 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 thrust washers for the input shaft. 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 CLUNK IN 2HI ONLY

Cause	Correction
DEFINITION: During acceleration or deceleration, a clunk is heard or felt in the transfer case. Review the **Symptoms - Transfer Case** and perform the necessary inspections.	
	1. Inspect the transfer case for the correct fluid level.

Incorrect fluid level or incorrect fluid	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. Refer to **One-Piece Propeller Shaft Replacement** and **Two-Piece Propeller Shaft Replacement** . • Replace the rear output shaft. 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** .
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**.
	1. Inspect for the following conditions: • Properly installed rear output shaft rear bearing

Rear output shaft rear bearing outer retaining ring	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	Correction
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	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**.
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**.
2/4 wheel drive synchronizer assembly	1. Inspect the synchronizer for the following conditions: • The synchronizer hub internal teeth to rear output shaft splines for excessive looseness caused by wear • The synchronizer sleeve engagement teeth to the drive sprocket for wear Refer to **Two/Four Wheel Drive Shift Components Cleaning and Inspection** . 2. Replace the synchronizer assembly if faulty. 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 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.	
High/low planetary carrier assembly	1. Inspect for the following conditions: • Excessively worn planetary gears • The planetary gears loose in the planetary 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 excessive 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 WILL NOT SHIFT

Cause	Correction
DEFINITION: While shifting from HI range to LO range, there is gear clashing or no HI range. Or the transfer case will not shift from 2 wheel drive to 4 wheel drive. Review the **Symptoms - Transfer Case** and perform the necessary inspections.	
Shift linkage worn	1. Inspect the shift linkage for correct adjustment or for being worn. 2. Replace the faulty component. Refer to **Transfer Case Control Lever Replacement** and **Transfer Case Control Rod Replacement**.
Mode shift clash	1. Disassemble the transfer case. Refer to **Transfer Case Disassemble**. 2. Inspect the synchronizer for being faulty. Refer to **Two/Four Wheel Drive Shift Components Cleaning and Inspection**. 3. Replace the synchronizer if faulty. Refer to **Transfer Case Assemble**.
	1. Disassemble the transfer case. Refer to **Transfer Case Disassemble**. 2. Inspect the synchronizer sleeve for sliding freely on the synchronizer hub.

Mode block	3. Inspect the synchronizer sleeve or synchronizer hub for being faulty. 4. Replace the synchronizer sleeve or synchronizer hub if it is faulty. Refer to **Transfer Case Assemble**. If the symptoms occur during cold temperatures, flush and fill the front axle with synthetic fluid. Refer to **Front Axle Lubricant Level Inspection (9.25 Inch Axle)** .
High/low shift fork	1. Inspect the high/low shift fork for the following conditions: • The pin on the shift fork for wear or damage • Worn or melted range 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 **Transfer Case Disassemble** and **Transfer Case Assemble** .
High/low clutch	1. Inspect the high/low clutch for the following conditions: • Engagement teeth for burrs or damage • Sliding freely on the rear output shaft • 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**.
	1. Inspect for the following conditions: • Failed input shaft pilot bearing in the input shaft • Journal on the rear output shaft for excessive wear

	or damage Refer to **Front Output Shaft and Input Shaft Cleaning and Inspection** and **Rear Output Shaft Cleaning and Inspection** .
Input shaft pilot bearing assembly	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.	
Shift linkage worn	1. Inspect the shift linkage for correct adjustment or for being worn. 2. Replace the faulty component. Refer to **Transfer Case Control Lever Replacement** and **Transfer Case Control Rod Replacement**.
High/low shift fork pads	1. Inspect the high/low shift fork pads for wear. Refer to **High/Low Shift Components Cleaning and Inspection**. 2. Replace the fork pads if worn. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
	1. Inspect the high/low shift fork for being damaged. Refer

Faulty high/low shift fork	to **High/Low Shift Components Cleaning and Inspection**. 2. Replace the shift fork if faulty. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
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**.
Faulty control actuator shaft	1. Inspect the control actuator shaft for wear. Refer to **High/Low Shift Components Cleaning and Inspection**. 2. Replace the control actuator shaft if 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**.
Front output shaft drive sprocket	1. Inspect the drive sprocket for worn engagement teeth. Refer to **Drive Chain, Drive Sprocket, and Driven Sprocket Cleaning and Inspection**. 2. Replace the drive sprocket if faulty. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
2/4 wheel drive synchronizer sleeve	1. Inspect the synchronizer sleeve for worn engagement teeth. Refer to **Two/Four Wheel Drive Shift Components Cleaning and Inspection**. 2. Replace the synchronizer sleeve 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 the correct amount of sealer on the plugs. Refer to **Sealers, Adhesives, and Lubricants**. 2. Install the plugs correctly. Refer to **Transfer Case Fluid Replacement**.
Access hole plugs leaking	Replace the access hole plugs or seal with room temperature vulcanizing (RTV) sealer.
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 leaking. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble** .
Shift lever seal leaking	Replace the shift lever seal. Refer to **Transfer Case Disassemble** and **Transfer Case Assemble**.
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 pipe 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 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 CONTROL LEVER REPLACEMENT

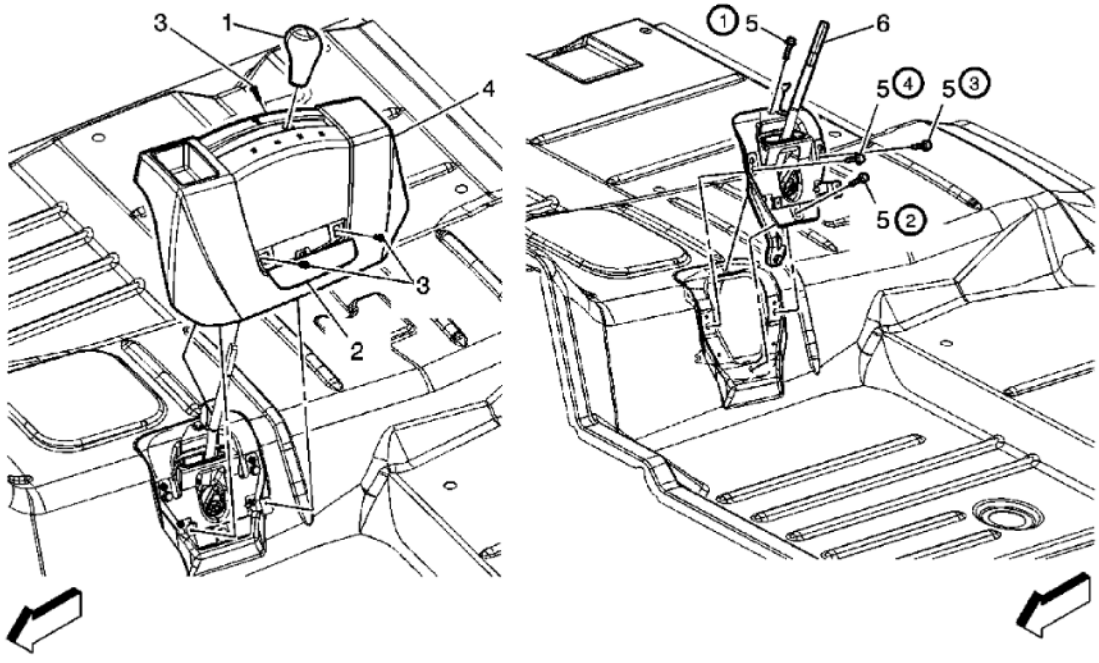


Fig. 4: Transfer Case Control Lever
Courtesy of GENERAL MOTORS CORP.

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** . 4. Remove the control rod. Refer to **Transfer Case Control Rod Replacement**.	
1	Transfer Case Control Lever Knob **Procedure** 1. Using an adjustable wrench, adjust the wrench to fit the control lever rod just below the knob. 2. With the adjustable wrench touching the control lever knob, gently tap on the adjustable wrench in an upward motion until the knob is separated from the control lever rod.
2	Transfer Case Control Lever Bezel Cover
3	Transfer Case Control Lever Bezel Screw (Qty: 3) **NOTE:** Refer to Fastener Notice . **Tighten:** 12 N.m (106 lb in)
4	Transfer Case Control Lever Bezel
5	Transfer Case Control Lever Bolt (Qty: 4) **Tip:** Tighten bolts in specified sequence. **Tighten:** 25 N.m (18 lb ft)
6	Transfer Case Control Lever

TRANSFER CASE CONTROL ROD REPLACEMENT

Removal Procedure

IMPORTANT: Before beginning the following service procedure, place the transmission into the PARK position. Then place the transfer case in the 2 HI position.

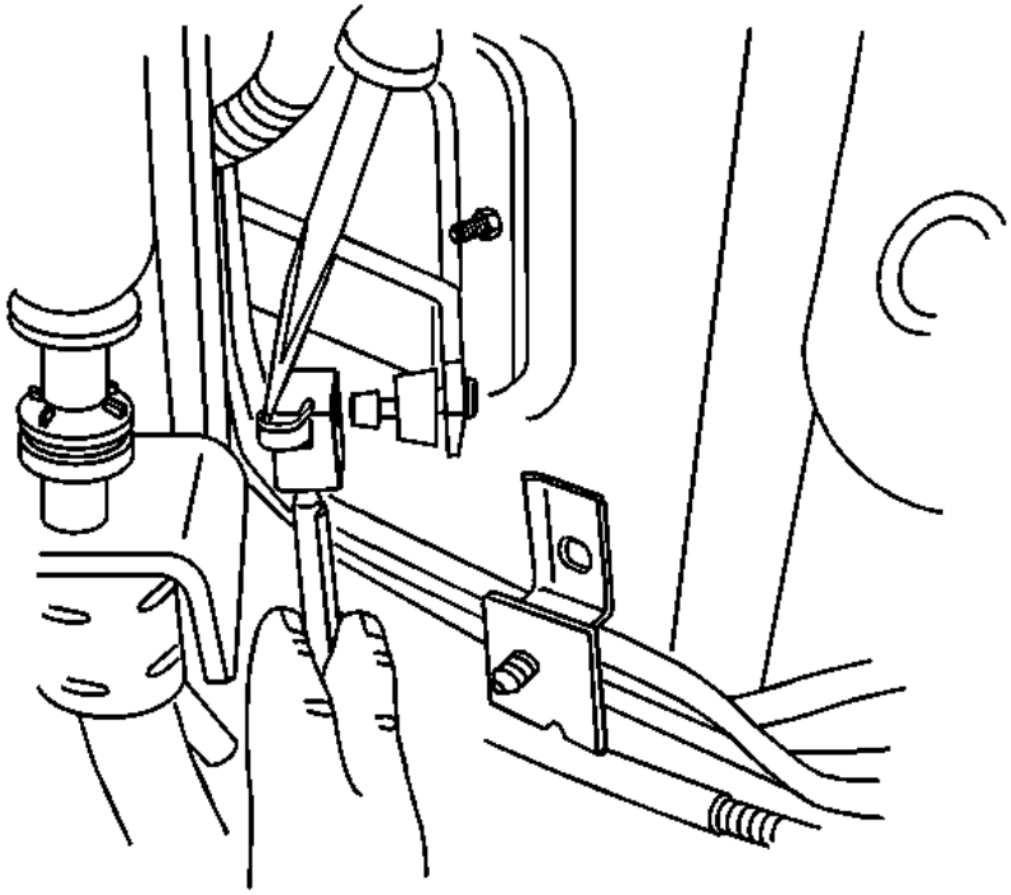


Fig. 5: View Of Transfer Case Control Rod From Control Lever
Courtesy of GENERAL MOTORS CORP.

1. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement** .
2. Remove the front propeller shaft. Refer to **Front Propeller Shaft Replacement** .

IMPORTANT: When performing this service procedure, use a small pocket screwdriver in order to release the retaining clip on the ends of the control rod.

3. Remove the control rod from the control lever.

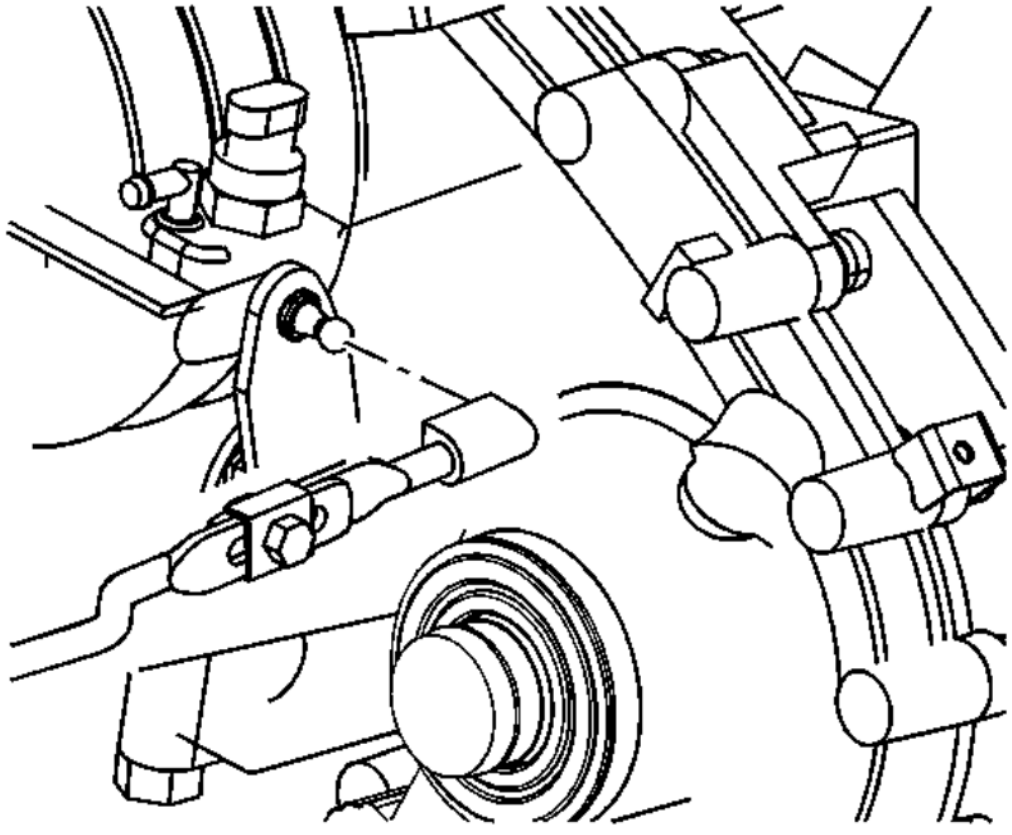


Fig. 6: View Of Transfer Case Control Rod
Courtesy of GENERAL MOTORS CORP.

4. Remove the control rod from the shift lever.
5. Remove the control rod.

Installation Procedure

IMPORTANT:

- **Before installing a NEW control rod, loosen the adjusting bolt on the control rod so it slides with slight resistance.**
- **When installing the control rod on the control levers, a snapping sound should be heard or felt upon installation.**

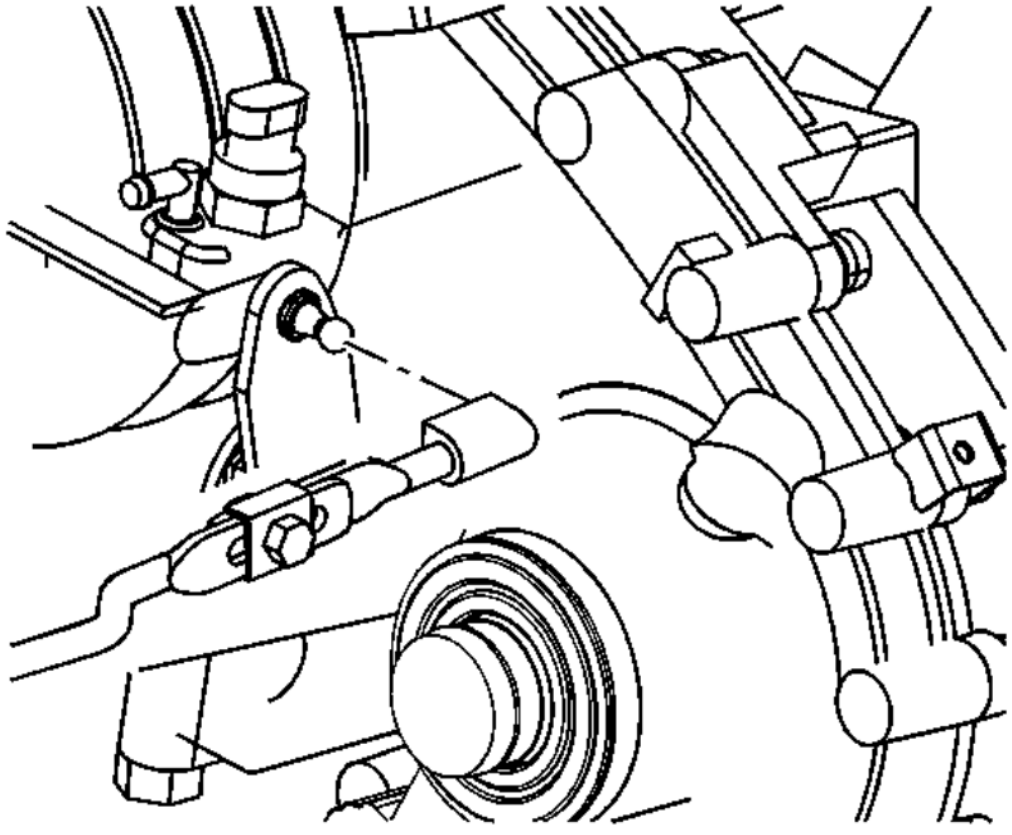


Fig. 7: View Of Transfer Case Control Rod
Courtesy of GENERAL MOTORS CORP.

1. Install the control rod onto the control lever first.

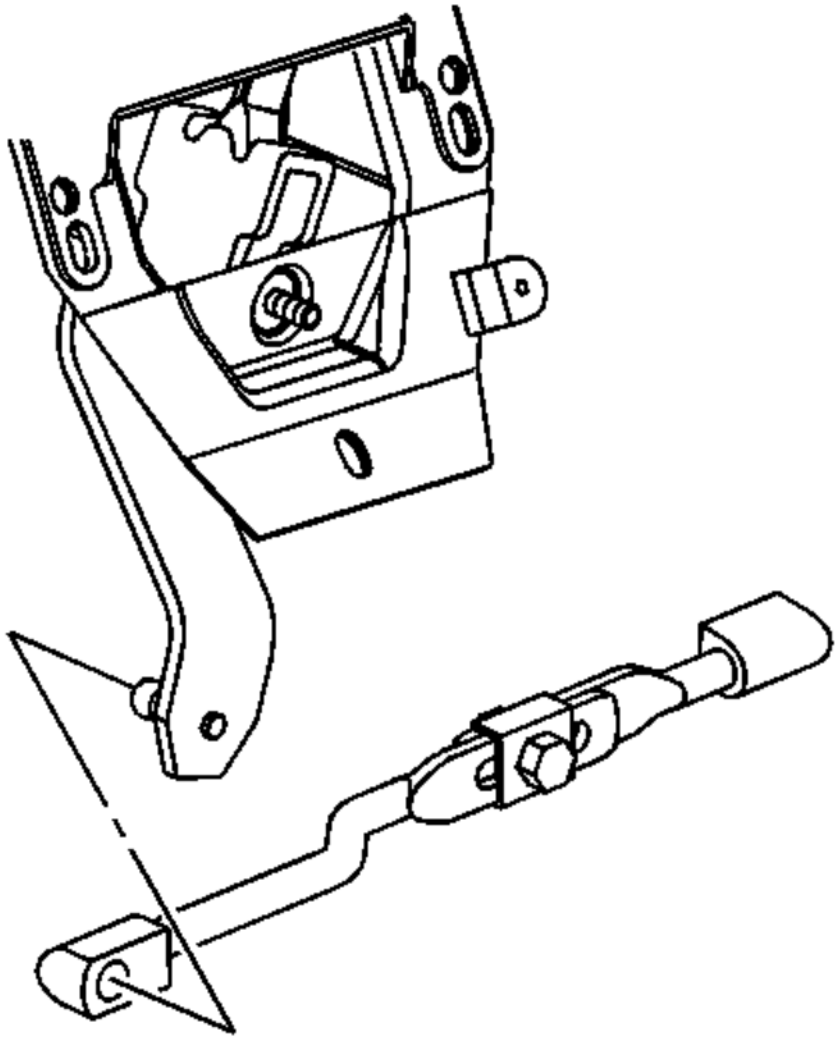


Fig. 8: View Of Transfer Case Control Rod & Shift Control Lever
Courtesy of GENERAL MOTORS CORP.

2. Slide the control rod forward.
3. Install the control rod onto the shift control lever.

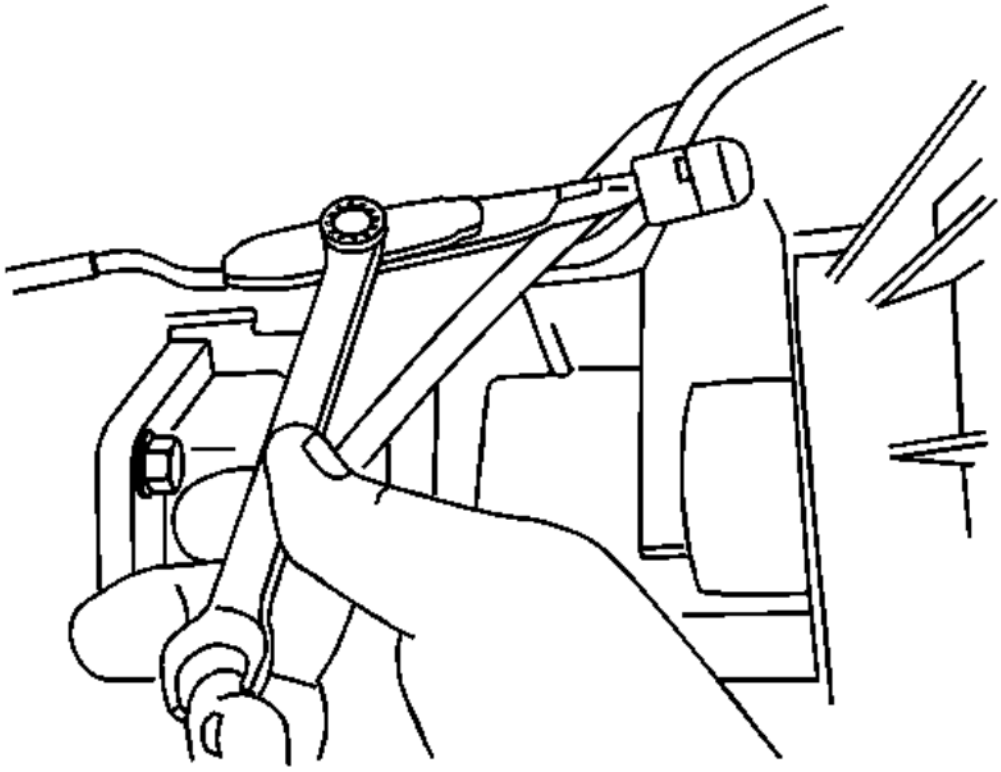


Fig. 9: View Of Transfer Case Control Rod Adjusting Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

4. Tighten the control rod adjusting bolt.

   Tighten: Tighten the bolt to 15 N.m (11 lb ft).

5. Install the front propeller shaft. Refer to **Front Propeller Shaft Replacement** .
6. Install the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement** .

TRANSFER CASE SHIELD REPLACEMENT

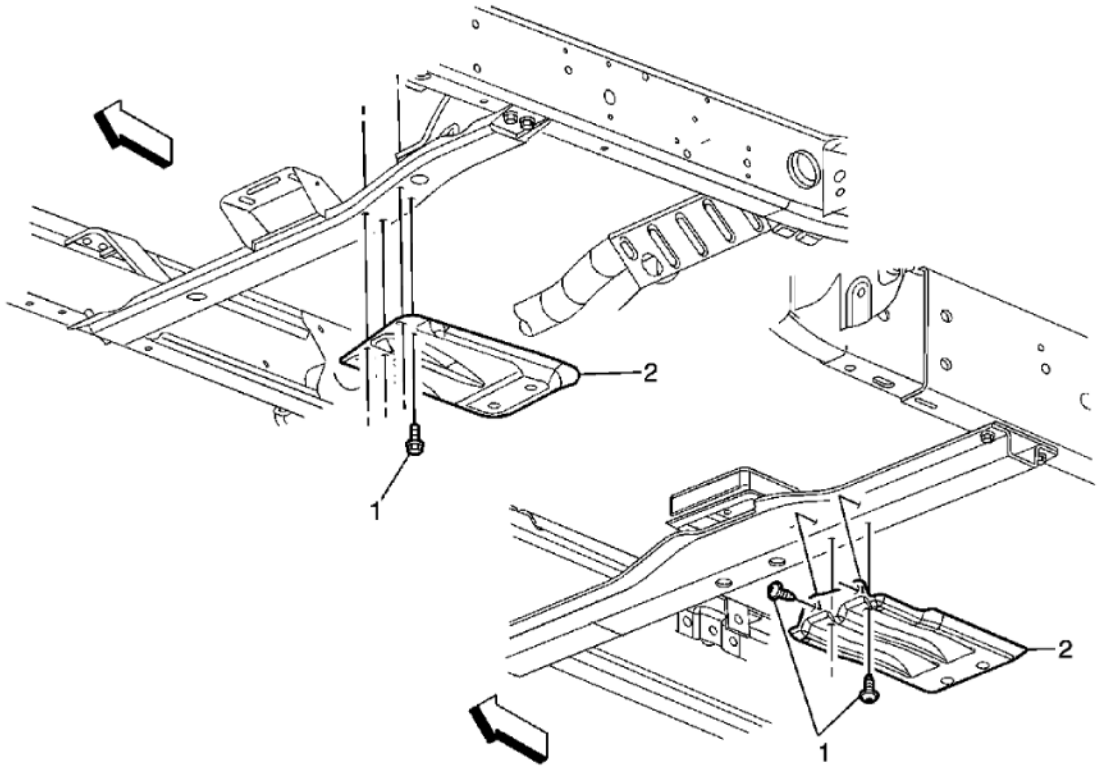


Fig. 10: Transfer Case Shield
Courtesy of GENERAL MOTORS CORP.

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

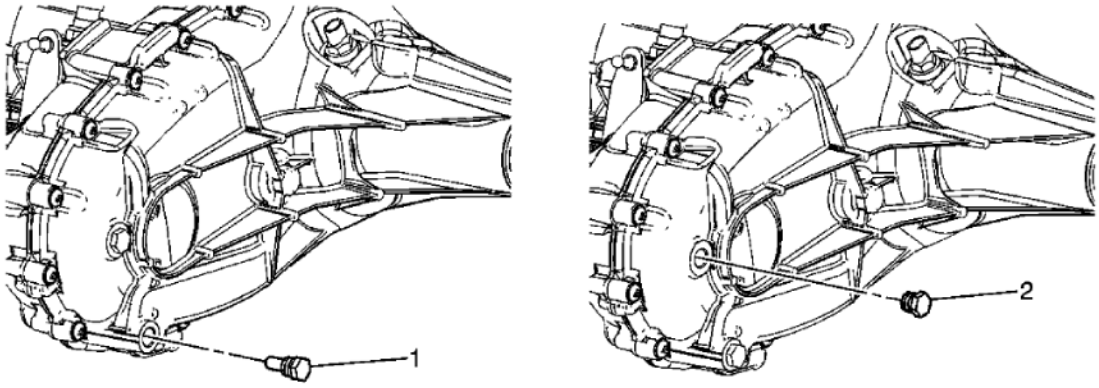


Fig. 11: View Of Transfer Case Fill Plug & Drain Plug
Courtesy of GENERAL MOTORS CORP.

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:** When performing the following procedure, use only hand tools to remove and install the drain plug. **Tighten:** 18 N.m (13 lb ft)
	Transfer Case Fill Plug **Procedure**

2	1. Fill the transfer case to the bottom of the fill plug hole with DEXRON® 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:** When performing the following procedure, use only hand tools to remove and install the fill plug. **Tighten:** 18 N.m (13 lb ft)

FRONT OUTPUT SHAFT SEAL REPLACEMENT

2008 Chevrolet Silverado 1500

2008 TRANSMISSION Transfer Case - MP 1222/1225/1226-NQG - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

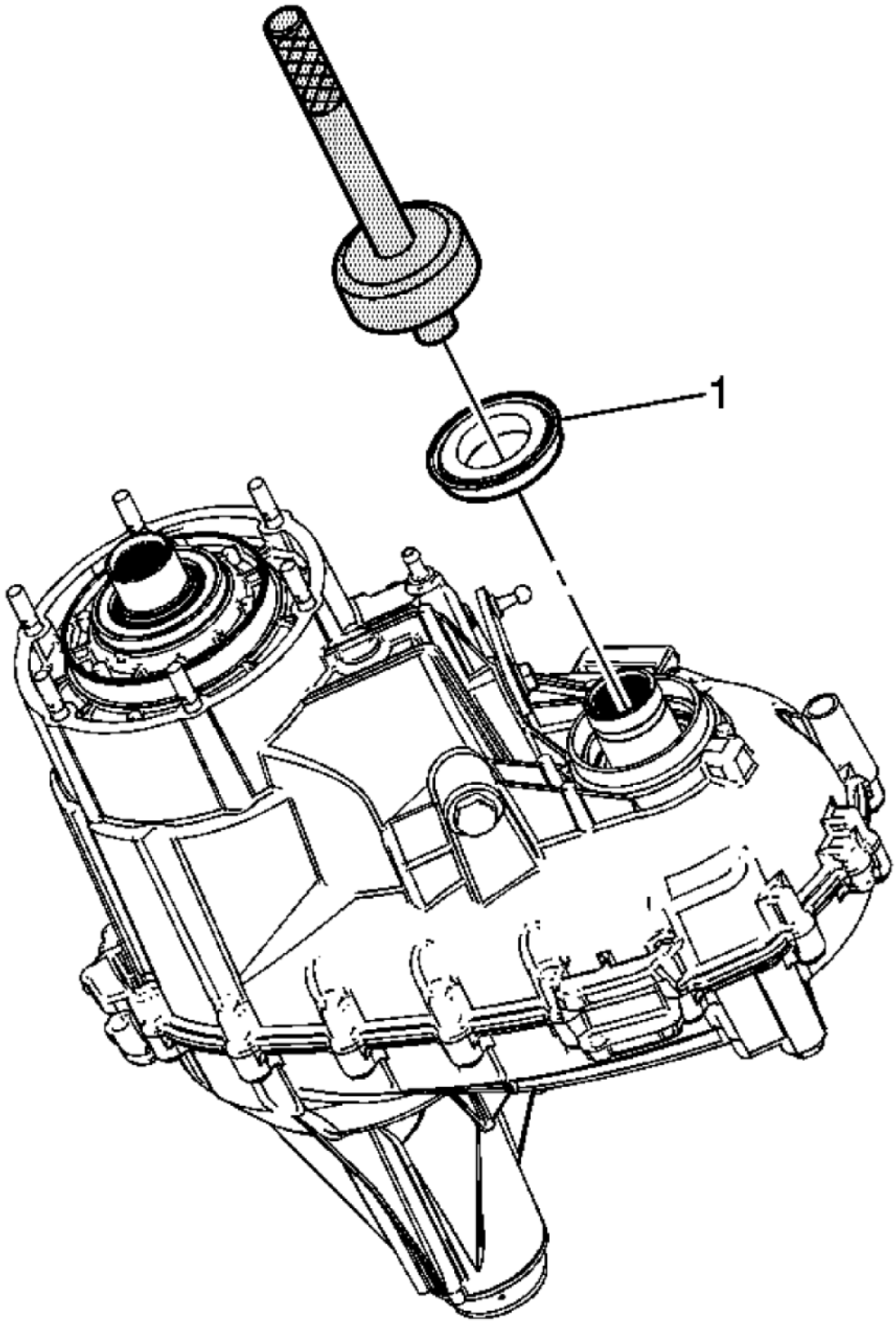


Fig. 12: Front Output Shaft Seal
Courtesy of GENERAL MOTORS CORP.

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** Drive Handle • **J 43484** Front Output Shaft Seal Installer

REAR OUTPUT SHAFT SEAL REPLACEMENT

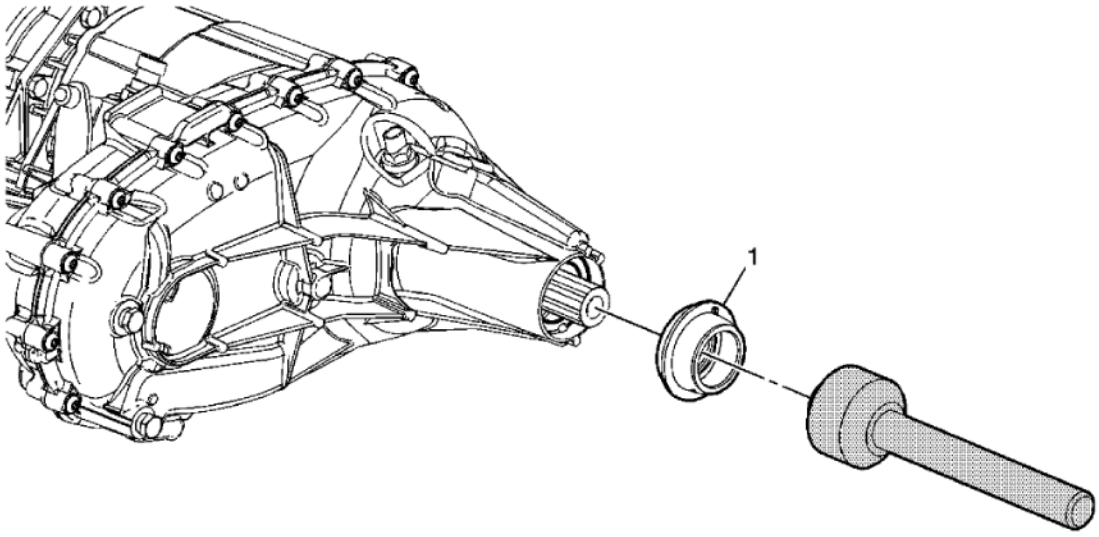


Fig. 13: Rear Output Shaft Seal

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). See **Special Tools**. • **J 8092** Drive Handle

TRANSFER CASE REAR EXTENSION BUSHING REPLACEMENT

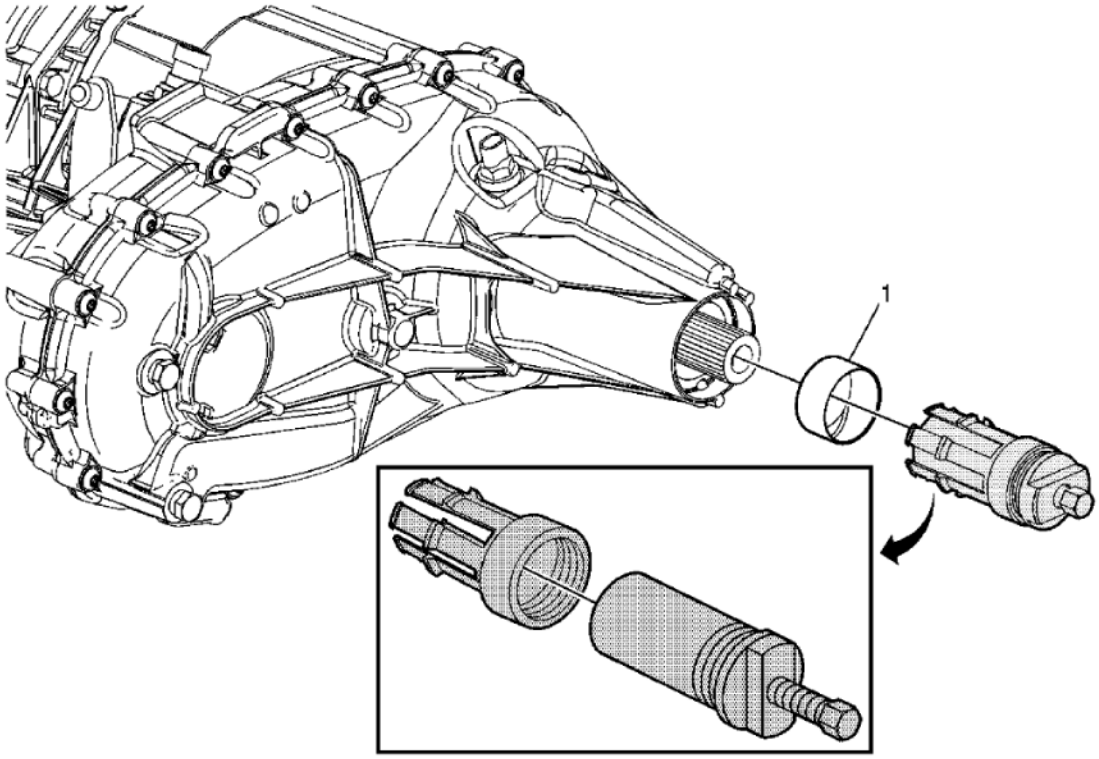


Fig. 14: Transfer Case Rear Extension Bushing
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
NOTE: **Refer to Transfer Case Seal Removal Notice .** **Preliminary Procedures:** Remove the transfer case rear output shaft seal. Refer to **Rear Output Shaft Seal Replacement**.	
	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. See **Special Tools**. 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). See **Special Tools**. 5. Install the NEW bushing on the finger section of the **DT-48734** (Heavy Duty) or **J 45380** (Light Duty). See **Special Tools**. 6. Install the finger section to the forcing tube assembly of the **DT-48734** (Heavy Duty) or **J 45380** (Light Duty). See **Special Tools**. 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). See **Special Tools**. • **J 45380** Transfer Case Rear Bushing Remover and Installer (Light Duty)

VEHICLE SPEED SENSOR REPLACEMENT

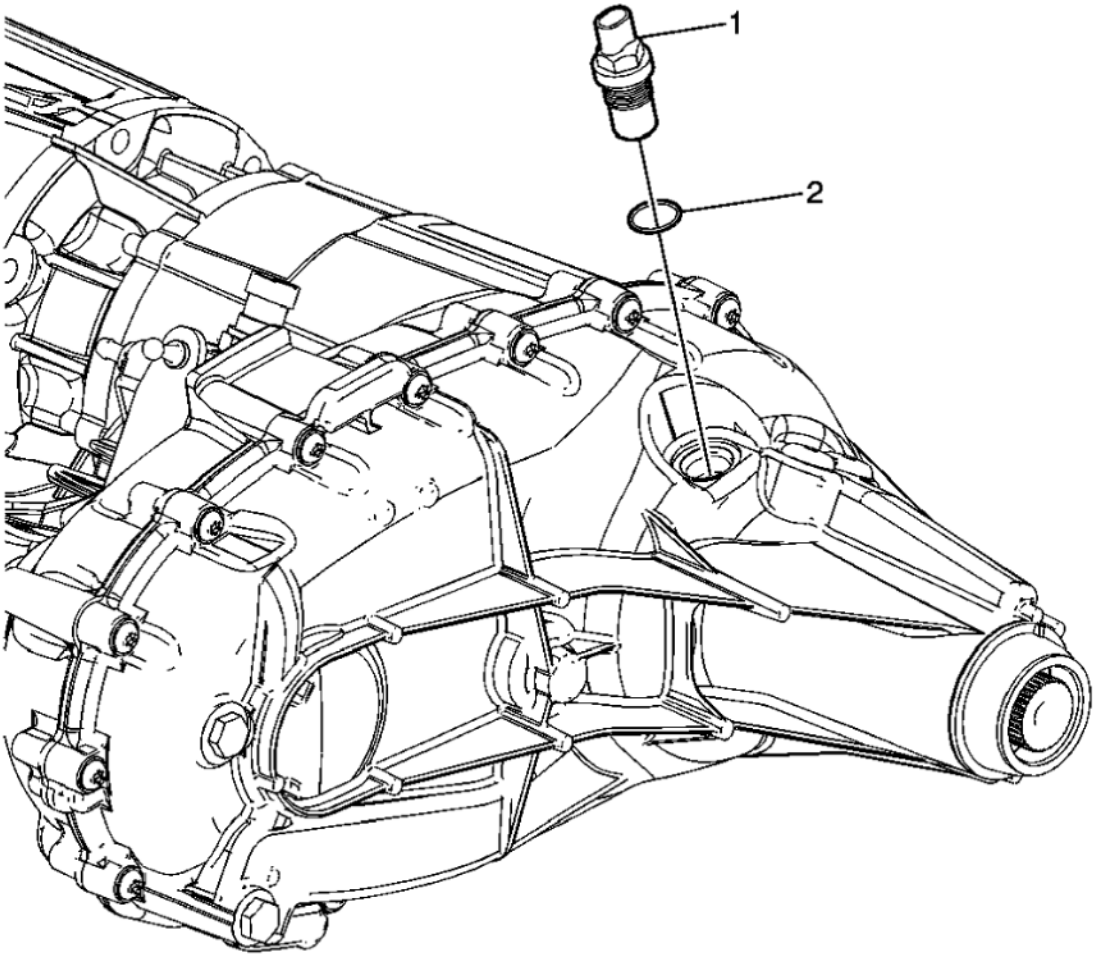


Fig. 15: View Of Vehicle Speed Sensor & O-Ring
Courtesy of GENERAL MOTORS CORP.

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 the 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.

TRANSFER CASE ASSEMBLY REPLACEMENT

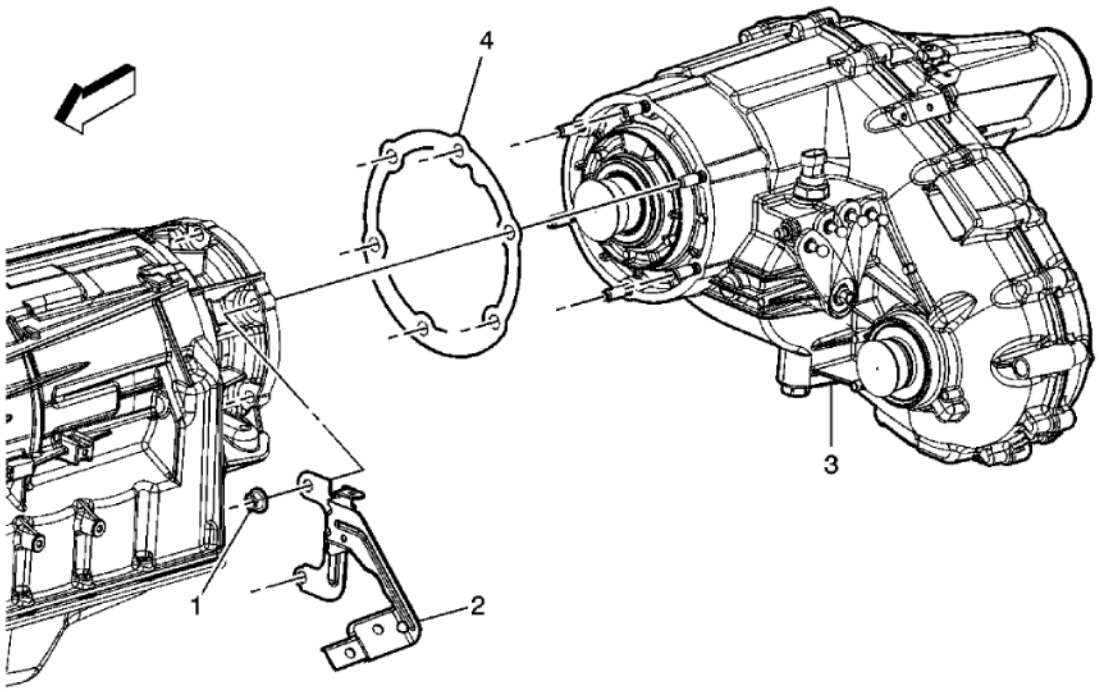


Fig. 16: View Of Transfer Case, Gasket, Fuel Line Bracket & Nut
Courtesy of GENERAL MOTORS CORP.

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. Disconnect the shift control rod from the transfer case. Refer to **Transfer Case Control Rod Replacement**.
8. 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)** .
9. Remove the transmission mount. Refer to **Transmission Mount Replacement (2WD)** or **Transmission Mount Replacement (4WD)** for the 4L60-E/4L65-E/4L70-E automatic transmission, or **Transmission Mount Replacement (2WD)** or **Transmission Mount Replacement (4WD)** for the 6L50/6L80/6L90 automatic transmission, or **Transmission Mount Replacement** for the Allison automatic transmission.

1	Transfer Case Nut **NOTE:** **Refer to Fastener Notice .** **Tighten:** 50 N.m (37 lb ft)
2	Fuel Line Bracket
3	Transfer Case
4	Transfer Case Gasket **Tip:** Install a NEW gasket without the use of any type of sealant or lubricant.

TRANSFER CASE ADAPTER REPLACEMENT

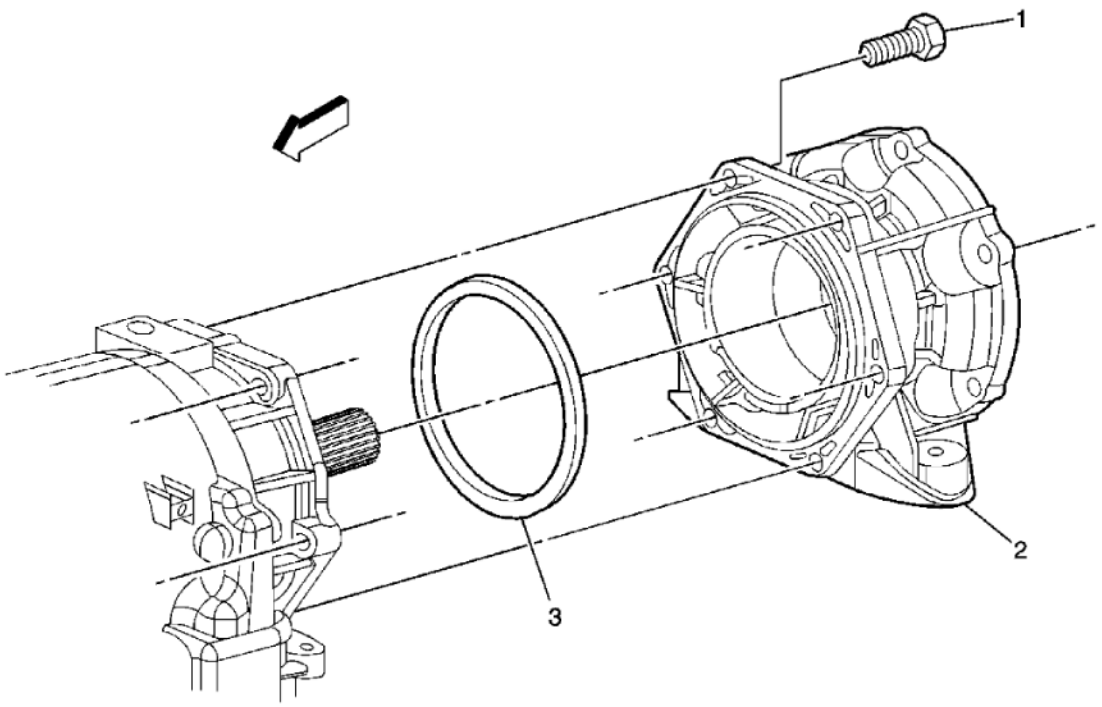


Fig. 17: View Of Transfer Case Adapter, Seal & Bolt
Courtesy of GENERAL MOTORS CORP.

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 automatic transmission, or **Transmission Mount Replacement (2WD)** or **Transmission Mount Replacement (4WD)** for the 6L50/6L80/6L90 automatic transmission, or **Transmission Mount Replacement** for the Allison automatic transmission.	
1	Transfer Case Adapter Bolt **NOTE:** **Refer to Fastener Notice .** **Tighten:** 50 N.m (37 lb ft)
2	Transfer Case Adapter
	Transfer Case Adapter Seal

3	**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

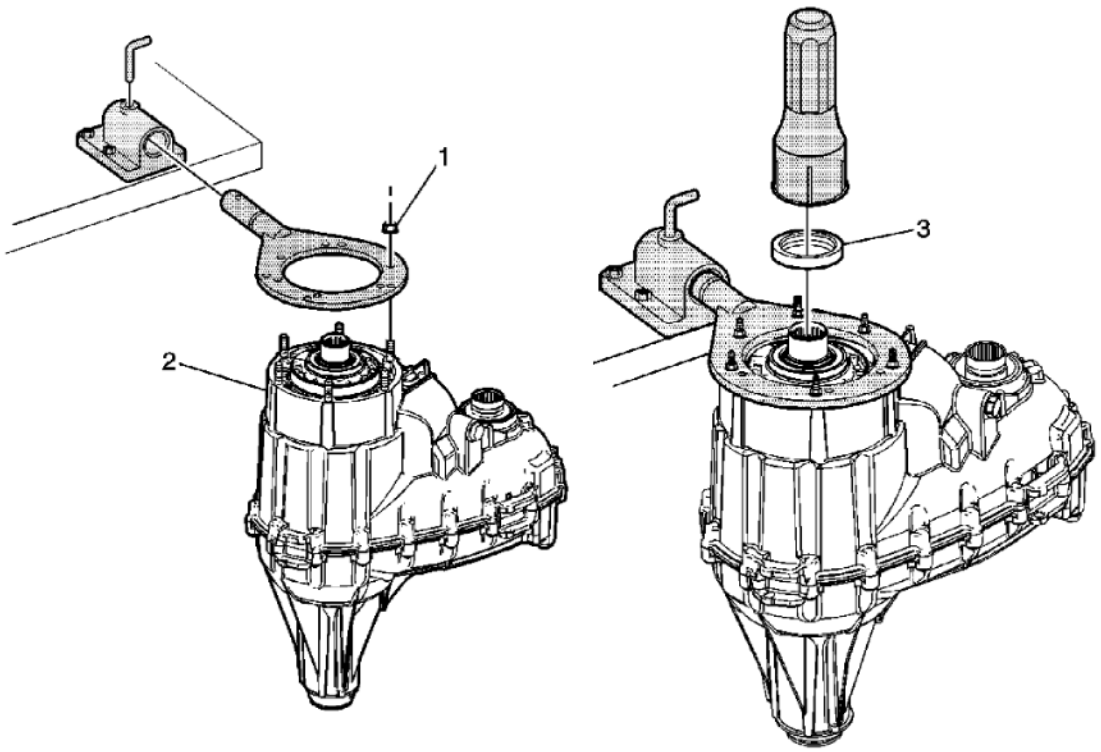


Fig. 18: View Of Transfer Case, Input Shaft Seal & Nuts
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the transfer case. Refer to **Transfer Case Assembly Replacement**.	
1	Transfer Case Nuts **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

3	Transfer Case Input Shaft Seal **Procedure** 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

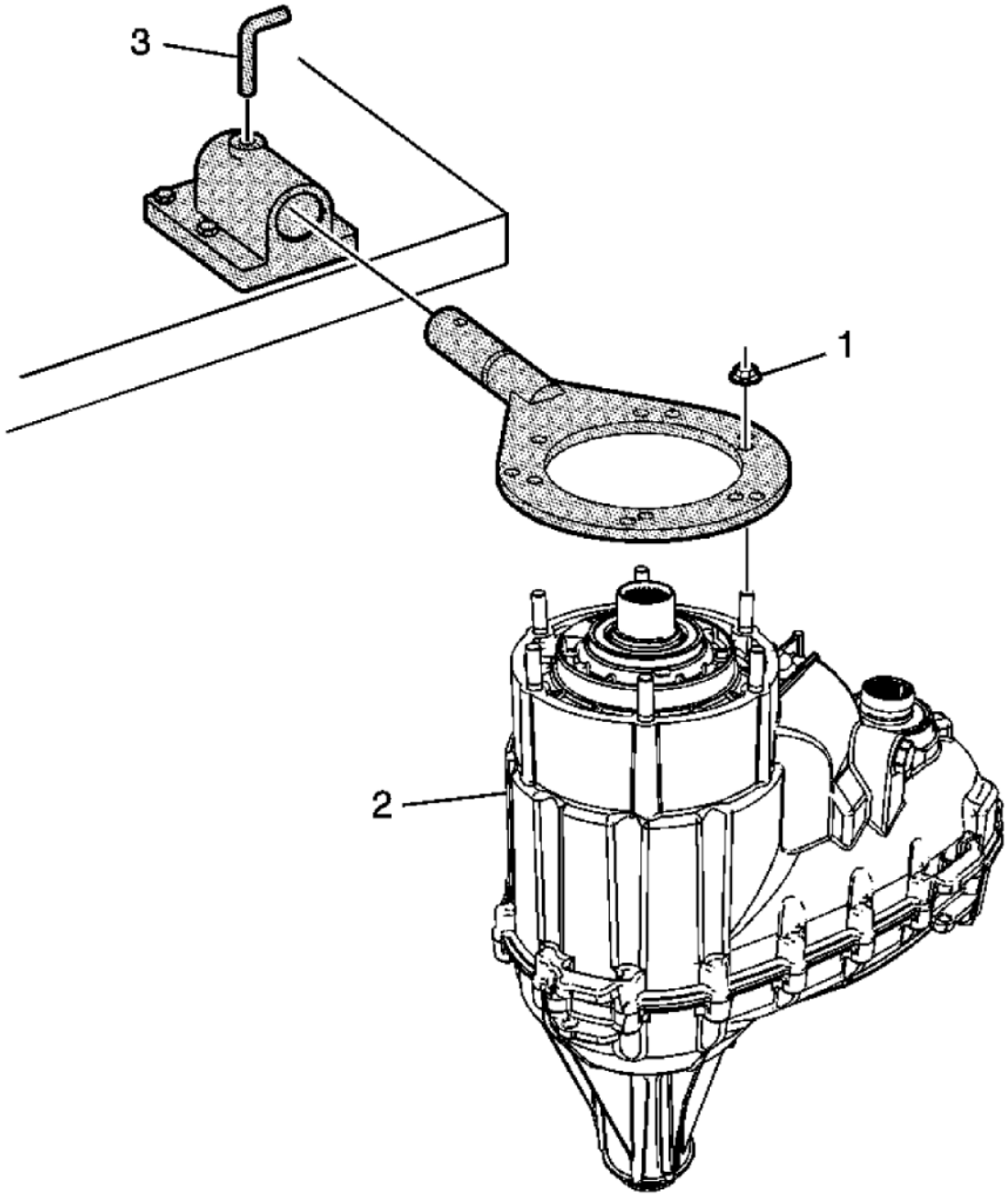


Fig. 19: View Of Pivot Pin, Transfer Case & Nuts
Courtesy of GENERAL MOTORS CORP.

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, Lever, Vent, Shift Control Switch, and Vehicle Speed Sensor Removal

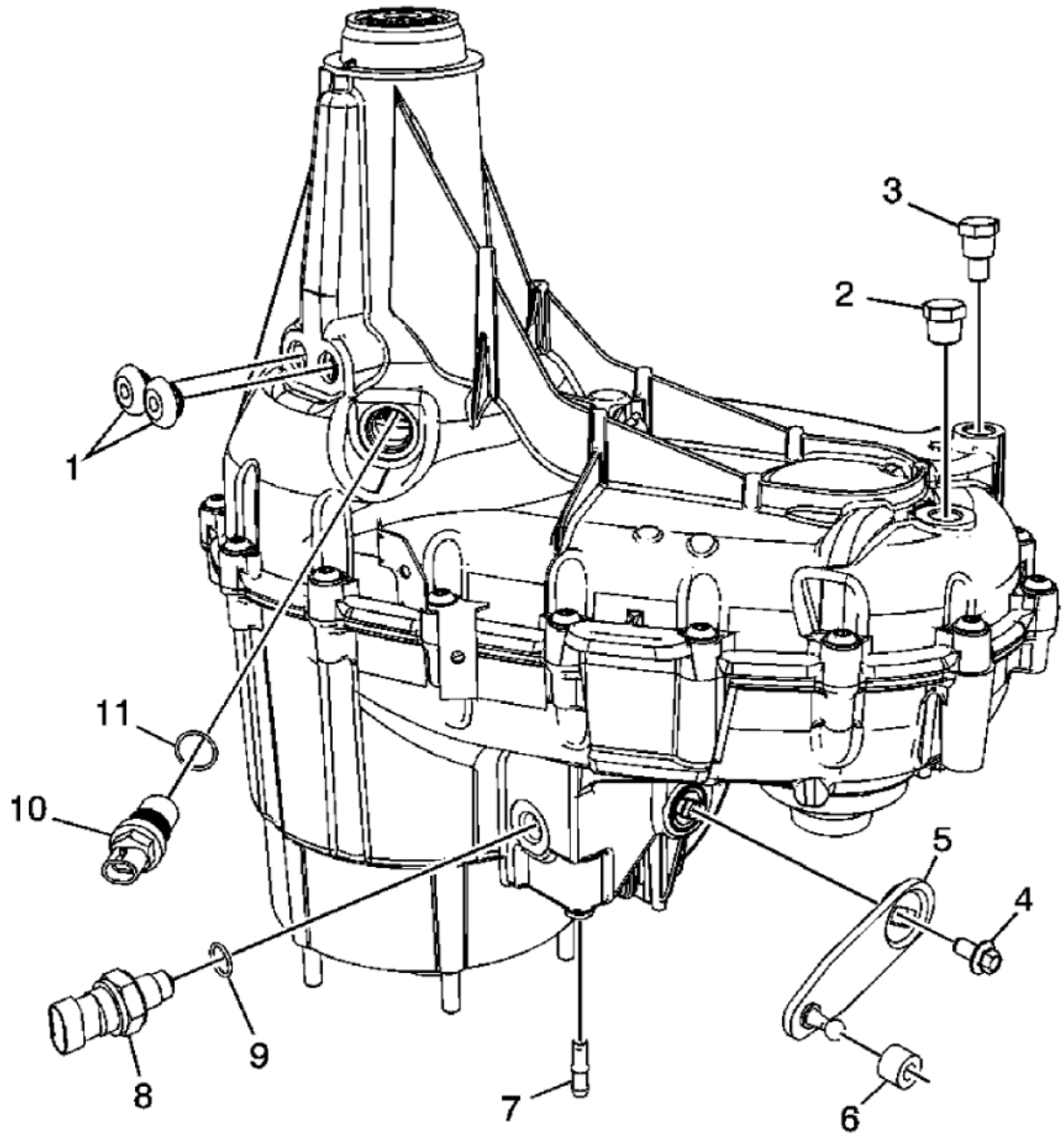


Fig. 20: View Of Access Hole Plugs, Fill & Drain Plug, Lever, Vent, Shift Control Switch, & Vehicle Speed Sensor
Courtesy of GENERAL MOTORS CORP.

Access Hole Plugs, Fill and Drain Plug, Lever, Vent, Shift Control Switch, and Vehicle Speed Sensor Removal

Callout	Component Name
1	Transfer Case Access Hole Plugs (Qty: 2)
2	Transfer Case Oil Fill Plug
3	Transfer Case Oil Drain Plug

4	Transfer Case Control Lever Bolt/Screw
5	Transfer Case Lever
6	Transfer Case Shift Lever Washer
7	Transfer Case Vent **Tip:** Remove ONLY if the vent pipe is damaged.
8	Transfer Case Shift Control Switch Assembly
9	Transfer Case Selector Switch - O-ring - Seal
10	Vehicle Speed Sensor Assembly
11	Vehicle Speed Sensor O-Ring Seal

Rear Output Shaft Seal and Bushing Removal

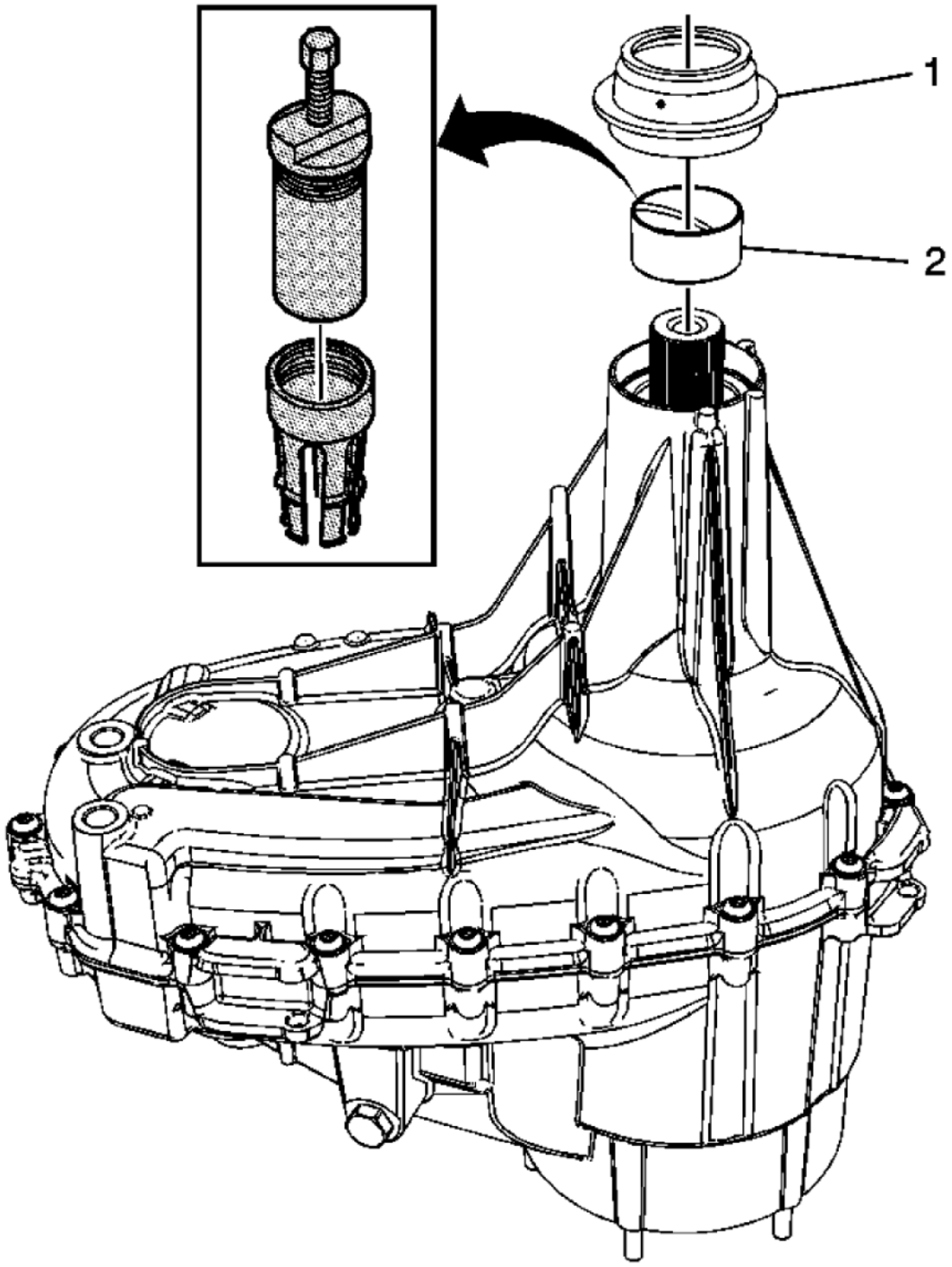


Fig. 21: View Of Transfer Case Rear Output Shaft Seal & Bushing
Courtesy of GENERAL MOTORS CORP.

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 tube 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

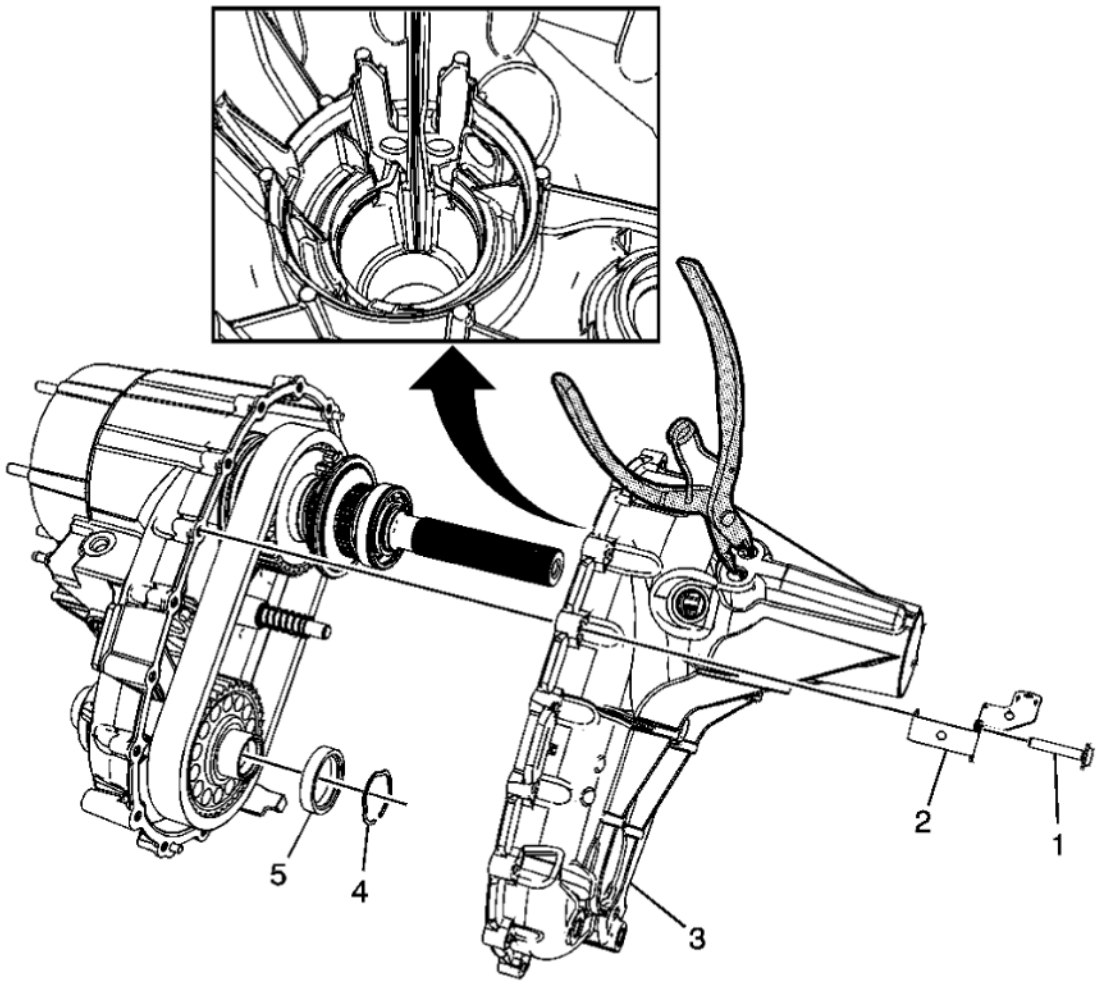


Fig. 22: View Of Transfer Case Halves & Components
Courtesy of GENERAL MOTORS CORP.

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 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.
4	Transfer Case Front Output Shaft Driven Sprocket Spacer Spring
5	Transfer Case Front Output Shaft Driven Sprocket Spacer

Oil Pump Suction Pipe and Shift Forks Removal

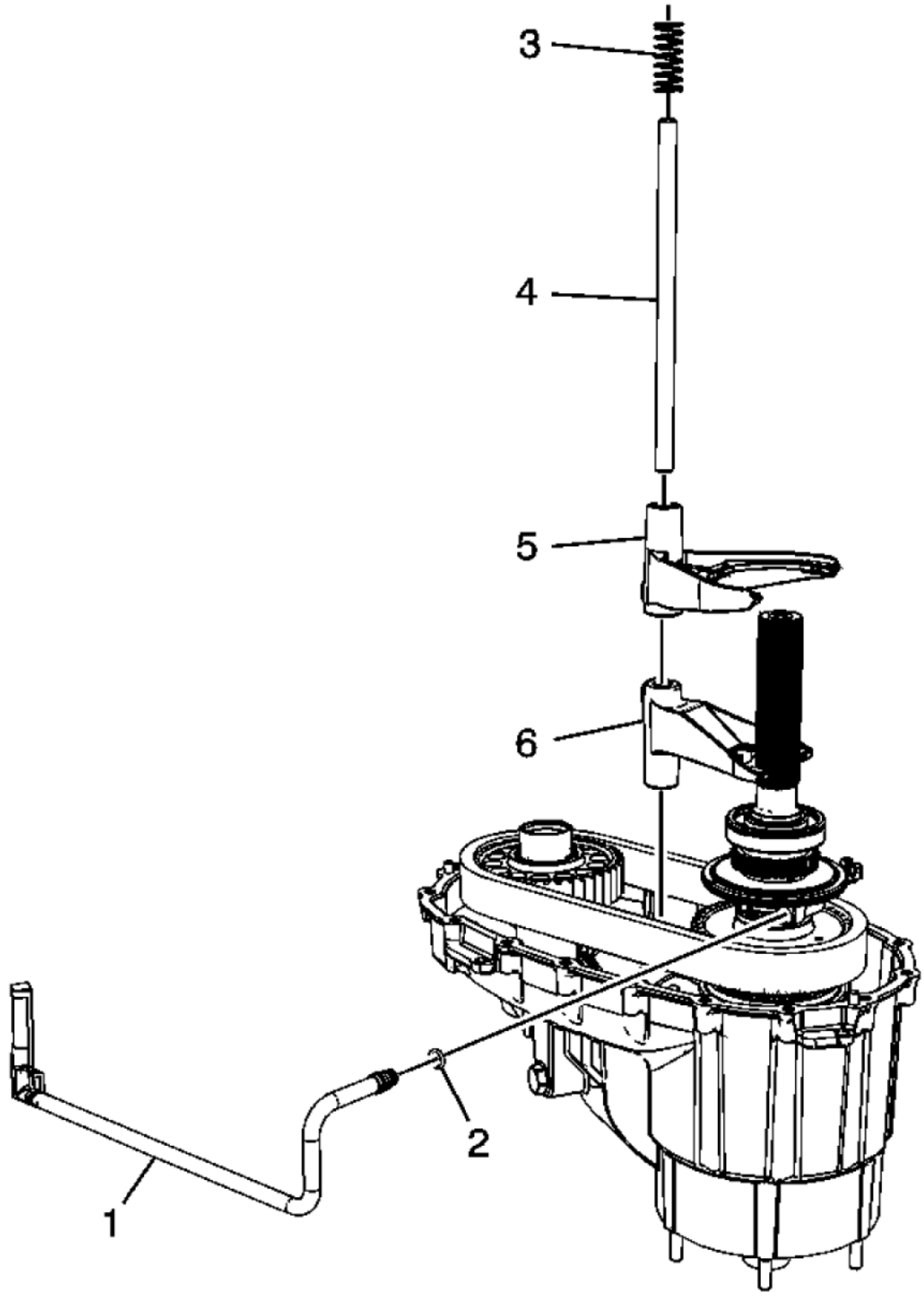


Fig. 23: Oil Pump Suction Pipe and Shift Forks

Courtesy of GENERAL MOTORS CORP.

Oil Pump Suction Pipe and Shift Forks Removal

Callout	Component Name
1	Transfer Case Oil Pump Suction Pipe
2	Transfer Case Oil Pump Suction Pipe Seal
3	Transfer Case Shift Fork Spring
4	Transfer Case Control Actuator Shaft
5	Transfer Case Two/Four Wheel Drive Shift Fork Assembly
6	Transfer Case High/Low Shift Fork

Drive Chain and Rear Output Shaft Assembly Removal

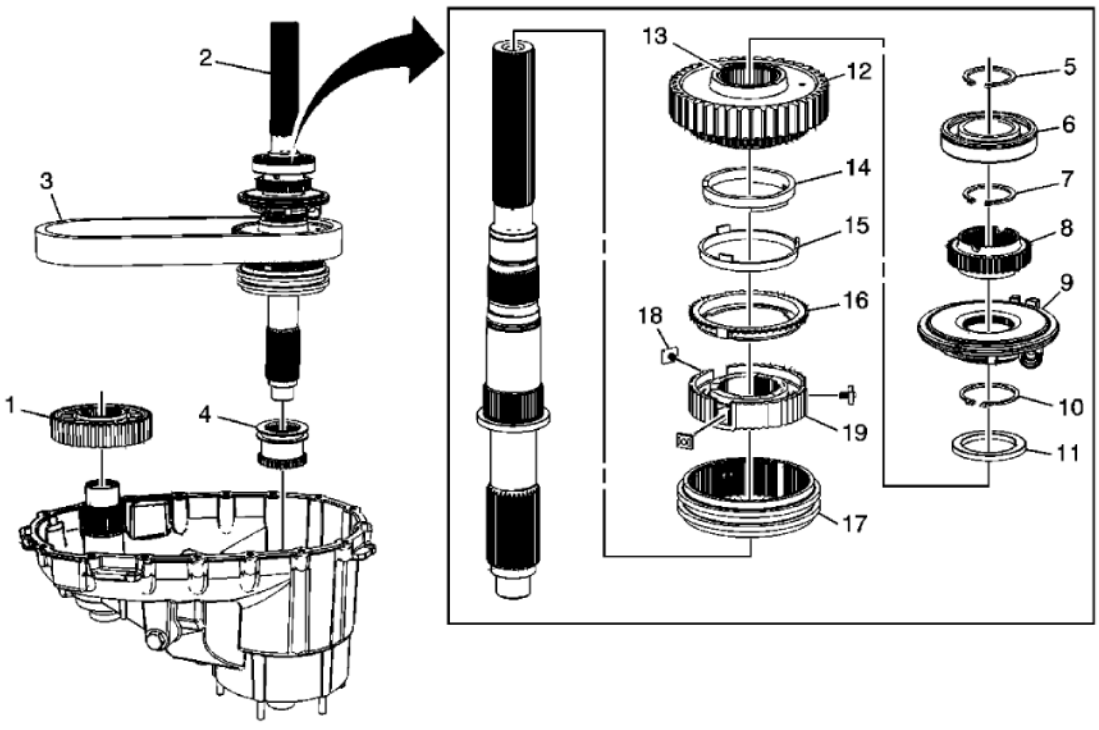


Fig. 24: Drive Chain and Rear Output Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

Drive Chain and Rear Output Shaft Assembly Removal

Callout	Component Name
1	Transfer Case Front Output Shaft Driven

	Sprocket
2	Transfer Case Rear Output Shaft Assembly **Tip:** Mount the assembly into a soft-jaw vice or holding fixture for disassembly.
3	Transfer Case Front Output Shaft Drive Chain Assembly
4	Transfer Case High/Low Clutch
5	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
6	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.
7	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
8	Transfer Case Rear Output Shaft Speed Reluctor Wheel
9	Transfer Case Oil Pump Assembly
10	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring
11	Transfer Case Front Output Shaft Drive Sprocket Spacer - Rear
12	Transfer Case Front Output Shaft Drive Sprocket
13	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**.
14	Transfer Case Two/Four Wheel Drive Synchronizer Blocking - Inner - Ring
15	Transfer Case Two/Four Wheel Drive Synchronizer Blocking - Outer - Ring
16	Transfer Case Two/Four Wheel Drive Synchronizer Assembly
17	Transfer Case Two/Four Wheel Drive Synchronizer Sleeve

18	Transfer Case Two/Four Wheel Drive Synchronizer Insert (Qty: 3)
19	Transfer Case Two/Four Wheel Drive Synchronizer Hub

Shift Detent Plunger Assembly, Shift Detent Lever, Input Shaft, and Planetary Assembly Removal

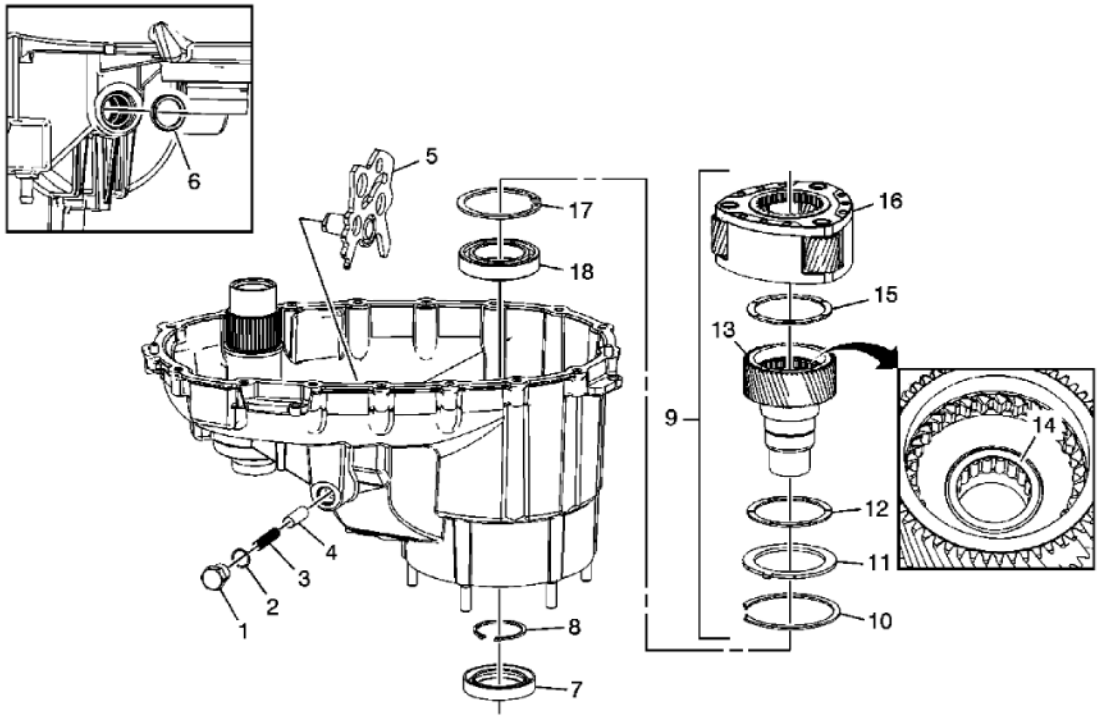


Fig. 25: Shift Detent Plunger Assembly, Shift Detent Lever, Input Shaft, and Planetary Assembly
Courtesy of GENERAL MOTORS CORP.

Shift Detent Plunger Assembly, Shift Detent Lever, Input Shaft, and Planetary Assembly Removal

Callout	Component Name
1	Transfer Case Shift Detent Plunger Plug
2	Transfer Case Shift Detent Plunger Plug Seal
3	Transfer Case Shift Detent Spring
4	Transfer Case Shift Detent Plunger
5	Transfer Case Shift Detent Lever Assembly
6	Transfer Case Shift Lever Seal

7	Transfer Case Input Shaft Seal
8	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.**
9	Transfer Case Input Shaft/Planetary Assembly
10	Transfer Case High/Low Planetary Carrier Retaining Ring
11	Transfer Case High/Low Locking Plate
12	Transfer Case Planetary Carrier Sun Gear Thrust Washer
13	Transfer Case Input Shaft
14	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**.
15	Transfer Case Planetary Carrier Sun Gear Thrust Washer
16	Transfer Case High/Low Planetary Carrier Assembly
17	Transfer Case Input Shaft Inner Retaining Ring
18	Transfer Case Input Shaft Bearing Assembly

Front Output Shaft Assembly Removal

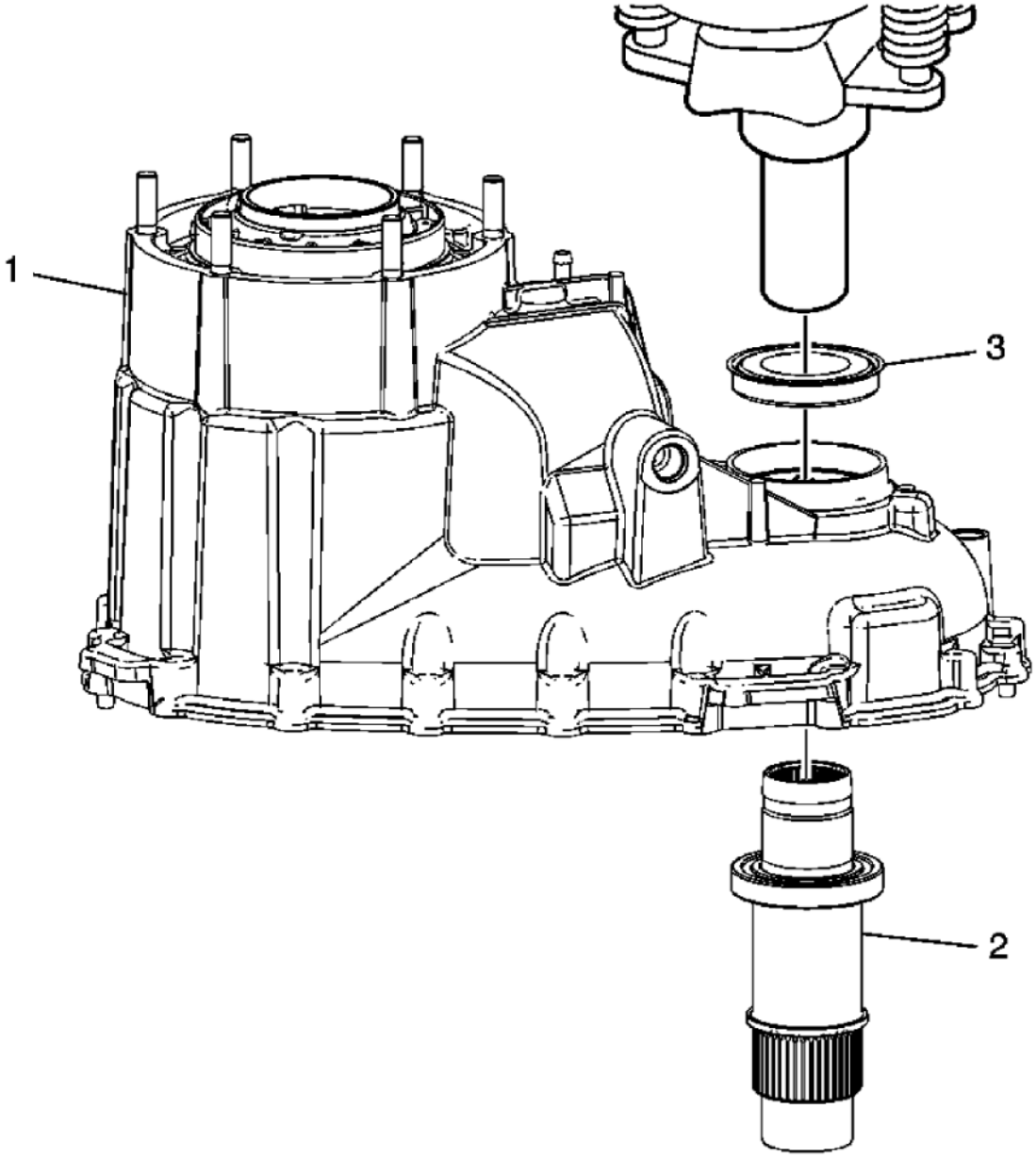


Fig. 26: Front Output Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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

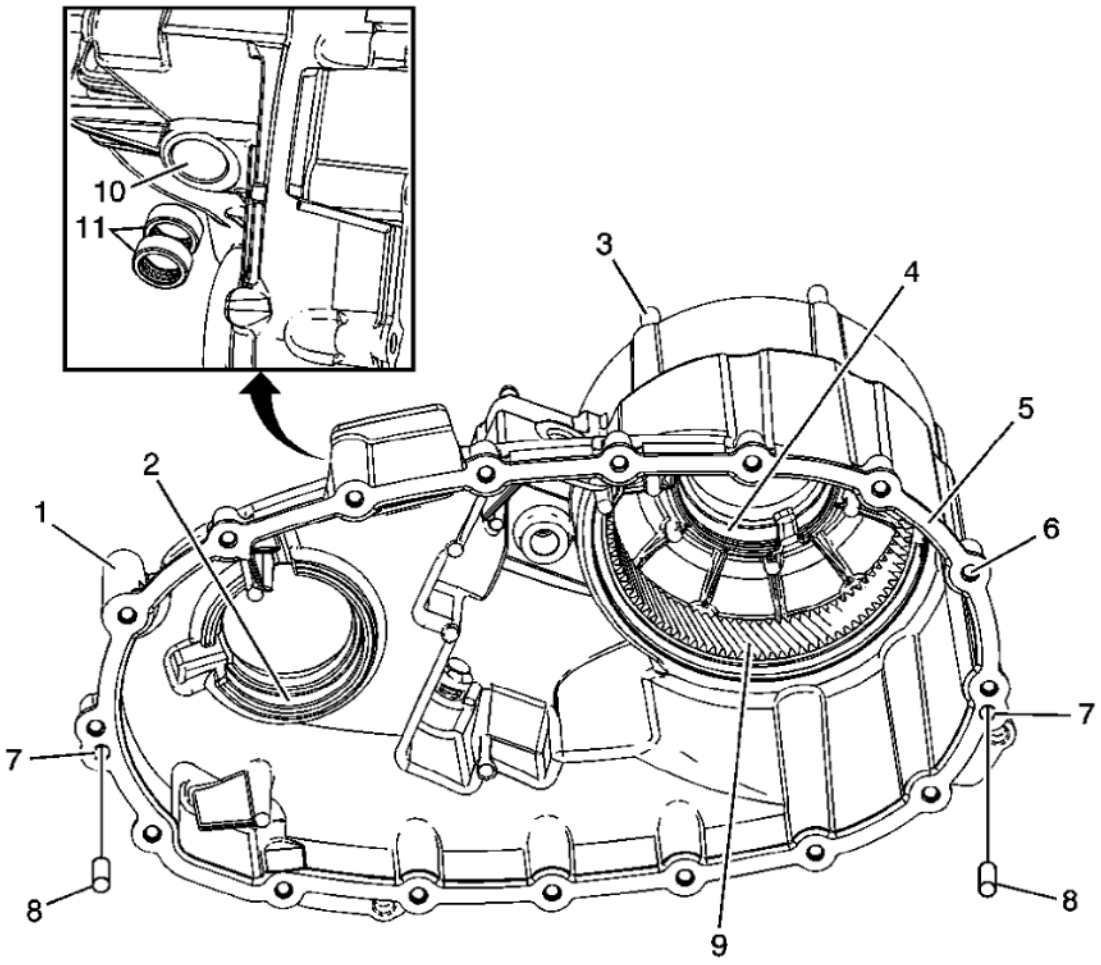


Fig. 27: View Of Transfer Case Front Half Inspection Points
Courtesy of GENERAL MOTORS CORP.

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 Studs (Qty: 6) **Tip:** Replace any damaged studs.
4	Transfer Case Input Shaft Bearing Bore **Tip:** Replace the front case half assembly if a bearing has spun or if cracks are detected.
5	Case Sealing Surface **Tip:** Repair small scratches or nicks with a soft stone.
6	Transfer Case Thread Bolt Holes **Tip:** Repair any damaged threads.
7	Transfer Case Locating Pin Holes **Tip:** Replace the front half case assembly if the locating pin holes are out of round or damaged.
8	Transfer Case Locating Pins (Qty: 2) **Tip:** Repair or replace loose, missing, or damaged locating pins.
9	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.
10	Transfer Case Shift Detent Lever Bearing Bore **Tip:** Replace the front case half assembly if a bearing has spun or if cracks are detected.

11	Transfer Case Shift Detent Lever Bearing Assembly **Tip:** Replace the bearings if roughness, brinelling, or pitting is detected. Refer to **Shift Detent Lever Bearing Replacement**.

TRANSFER CASE REAR HALF CLEANING AND INSPECTION

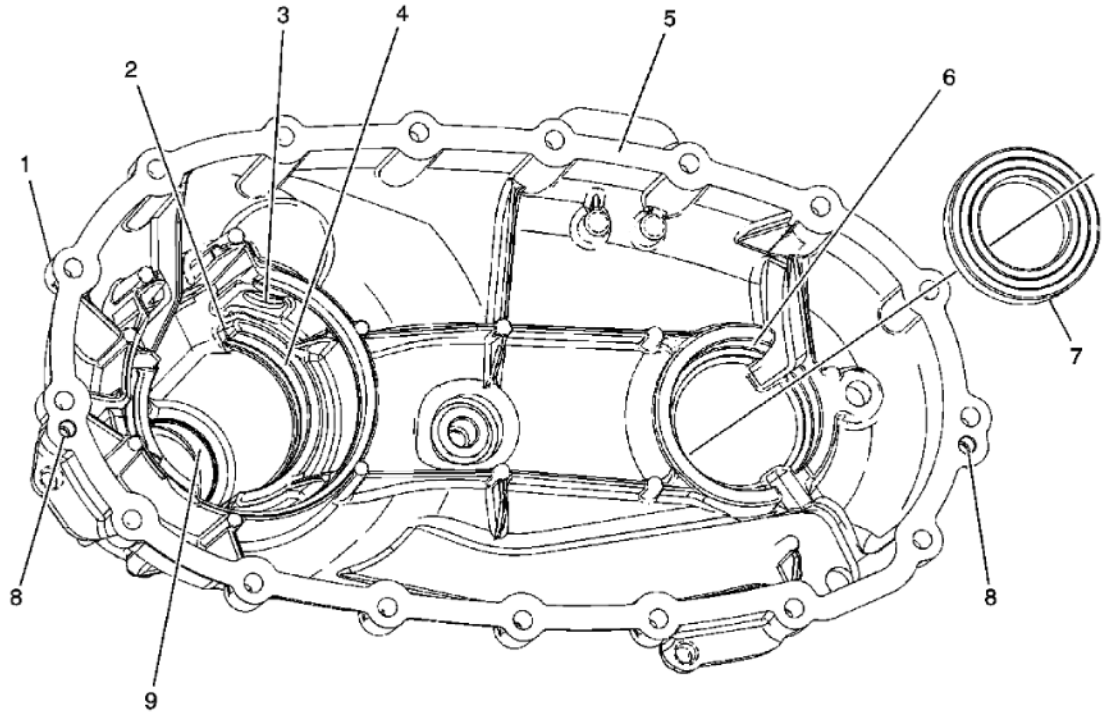


Fig. 28: View Of Transfer Case Rear Half Inspection Points
Courtesy of GENERAL MOTORS CORP.

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 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	Case Sealing Surface **Tip:** Repair small scratches or nicks with a soft stone.
6	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.
7	Transfer Case Front Output Shaft Rear Bearing Assembly **Tip:** Replace the bearing if roughness, brinelling, or pitting is detected. Refer to **Front Output Shaft Rear Bearing Replacement**.
8	Transfer Case Locating Pin Holes **Tip:** Replace the rear case half assembly if the locating pin holes are out of round or damaged.
9	Transfer Case Rear Output Shaft Bushing **Tip:** • Replace the bushing if it is damaged or worn. ○ For light duty (LD) vehicles, refer to **Transfer Case Disassemble** and **Transfer Case Assemble** . ○ For heavy duty (HD) and super heavy duty (SHD) vehicles, refer to **Rear Output Shaft Bushing Replacement** . • 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

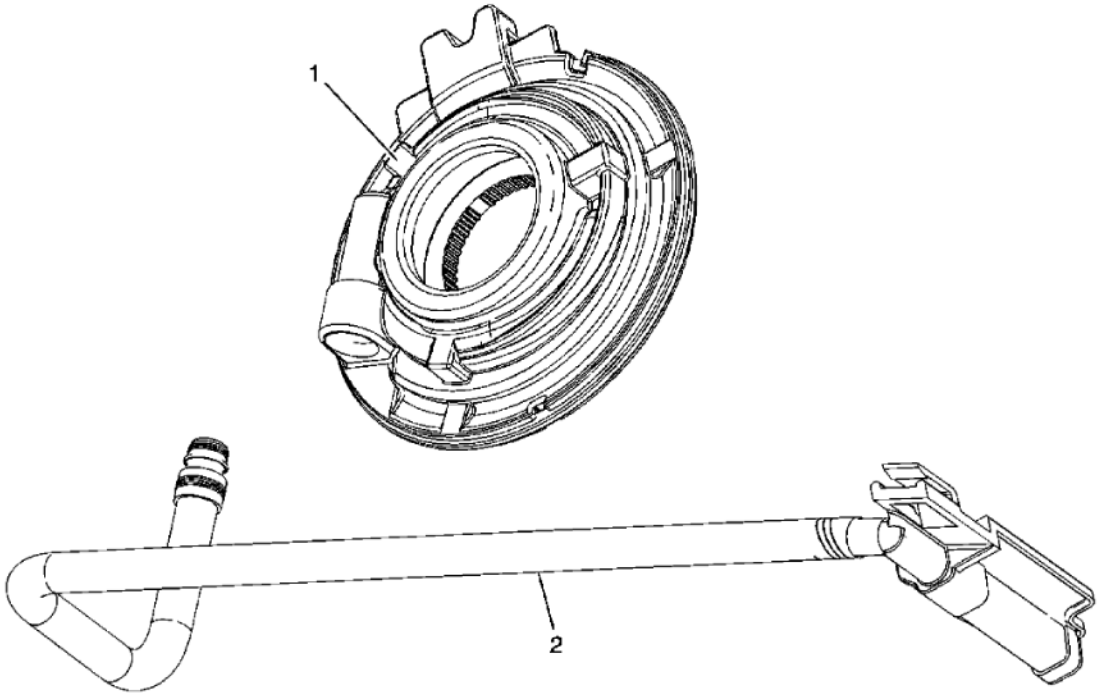


Fig. 29: View Of Transfer Case Oil Pump Assembly & Suction Pipe
Courtesy of GENERAL MOTORS CORP.

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

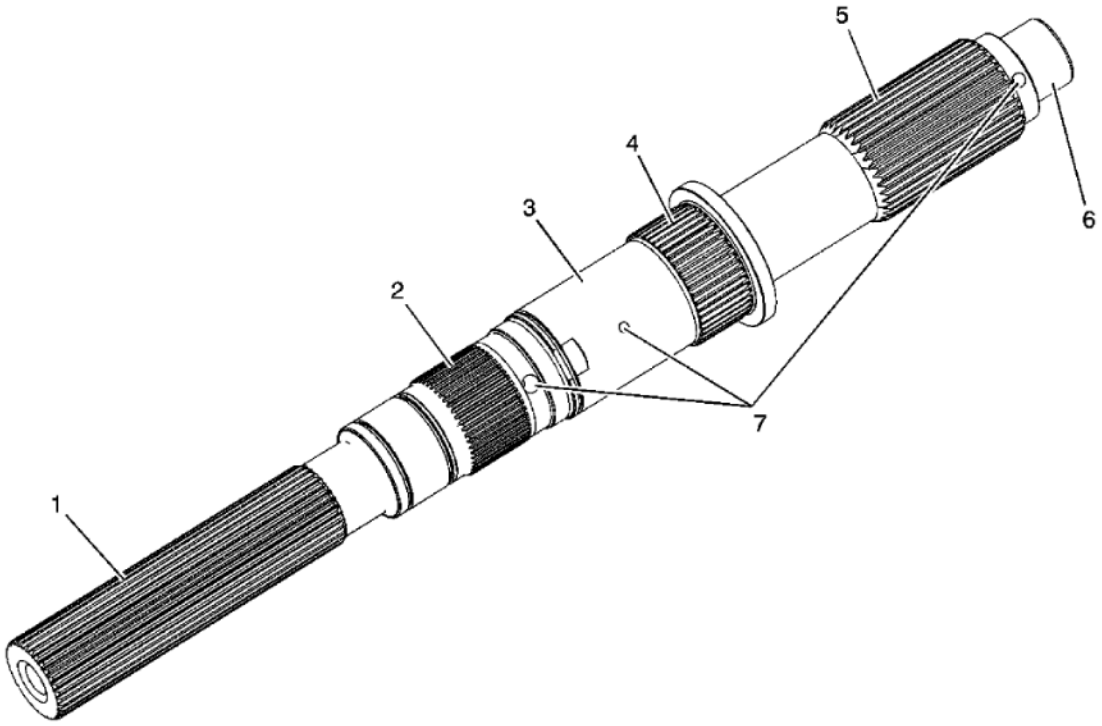


Fig. 30: View Of Output Shaft Inspection Points
Courtesy of GENERAL MOTORS CORP.

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

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

FRONT OUTPUT SHAFT AND INPUT SHAFT CLEANING AND INSPECTION

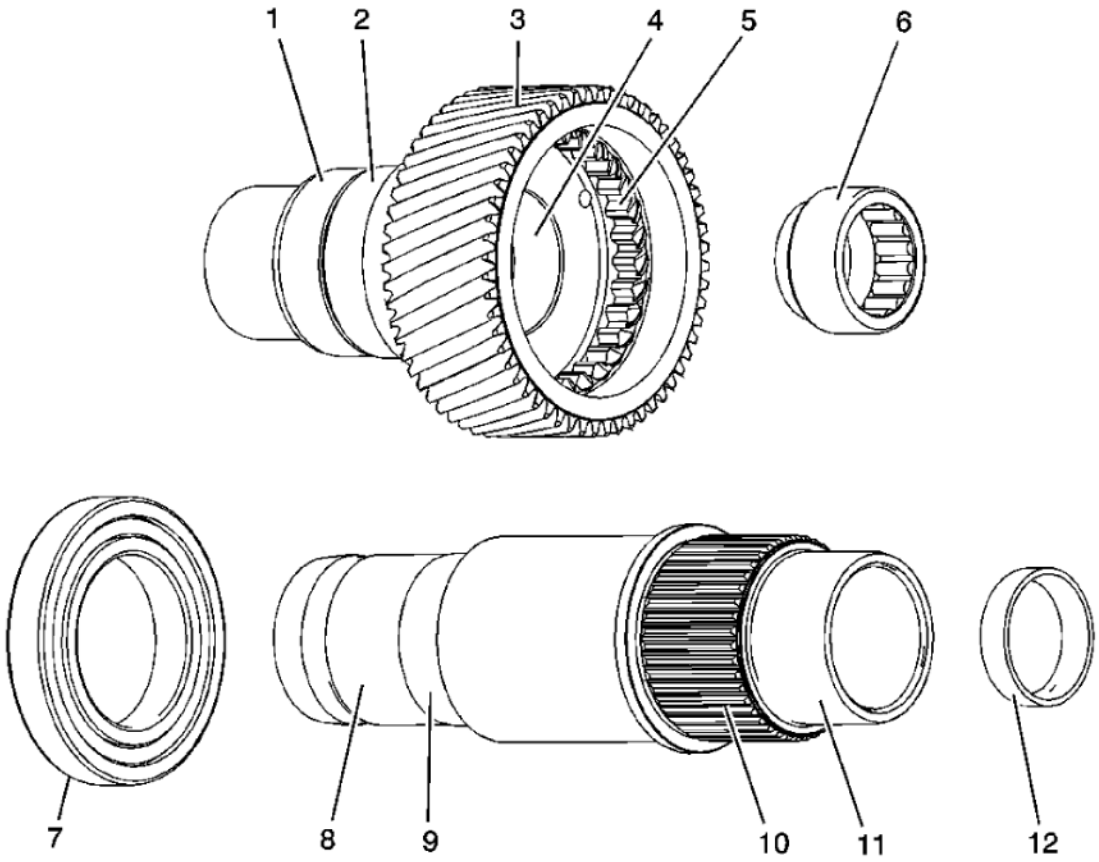


Fig. 31: View Of Front Output Shaft & Input Shaft Inspection Points
Courtesy of GENERAL MOTORS CORP.

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.
	Transfer Case Input Shaft Planetary Teeth

3	**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 Front Output Shaft Front Bearing Assembly **Tip:** Replace the bearing if roughness, brinelling, or pitting is detected. Refer to **Front Output Shaft Front Bearing Replacement**.
8	Transfer Case Front Output Shaft Seal Surface **Tip:** Inspect for pitting, excessive wear, or damage.
9	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.
10	Transfer Case Front Output Shaft Driven Sprocket Engagement Splines **Tip:** Witness marks at the location of the sprocket is normal.
11	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.

12	Transfer Case Front Output Shaft Hole Plug **Tip:** Replace the plug, if removed. Refer to **Front Output Shaft Front Bearing Replacement**.

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

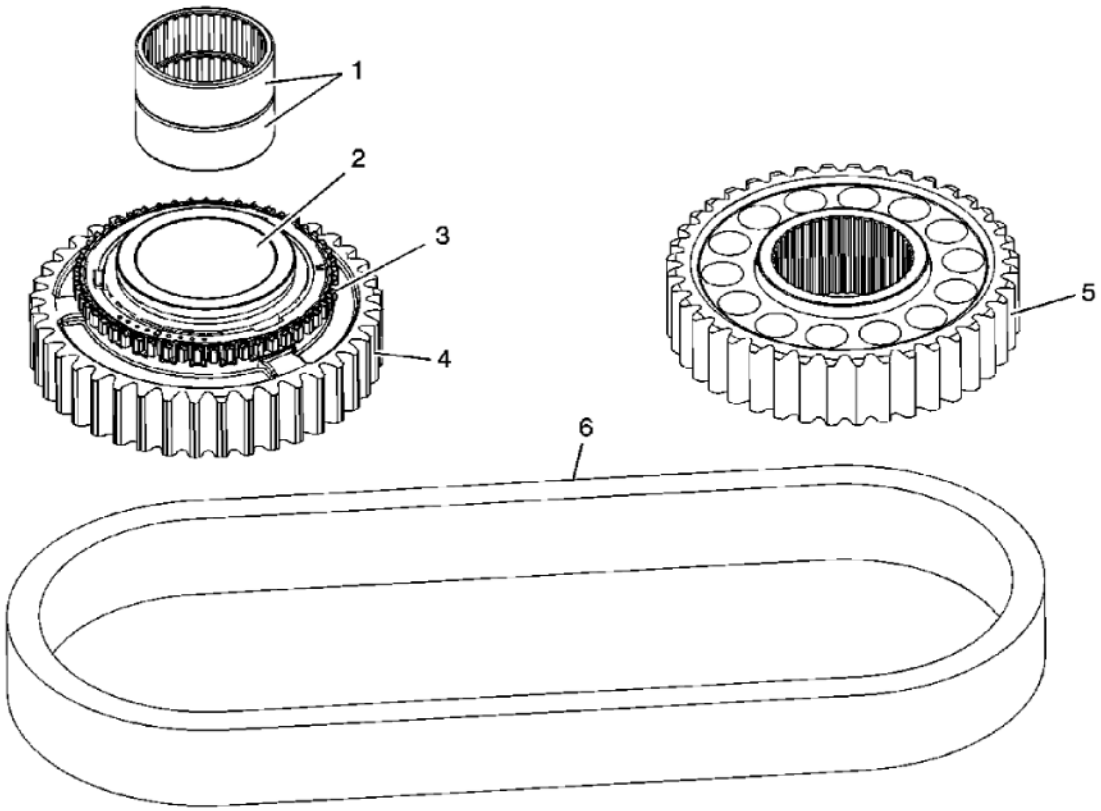


Fig. 32: View Of Drive Chain, Drive Sprocket, & Driven Sprocket Inspection Points
Courtesy of GENERAL MOTORS CORP.

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 Surface **Tip:** If the bearing is removed, inspect for excessive wear, damage, or if the bearing has spun in the bore.
3	Transfer Case Two/Four Wheel Drive Synchronizer Sleeve 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

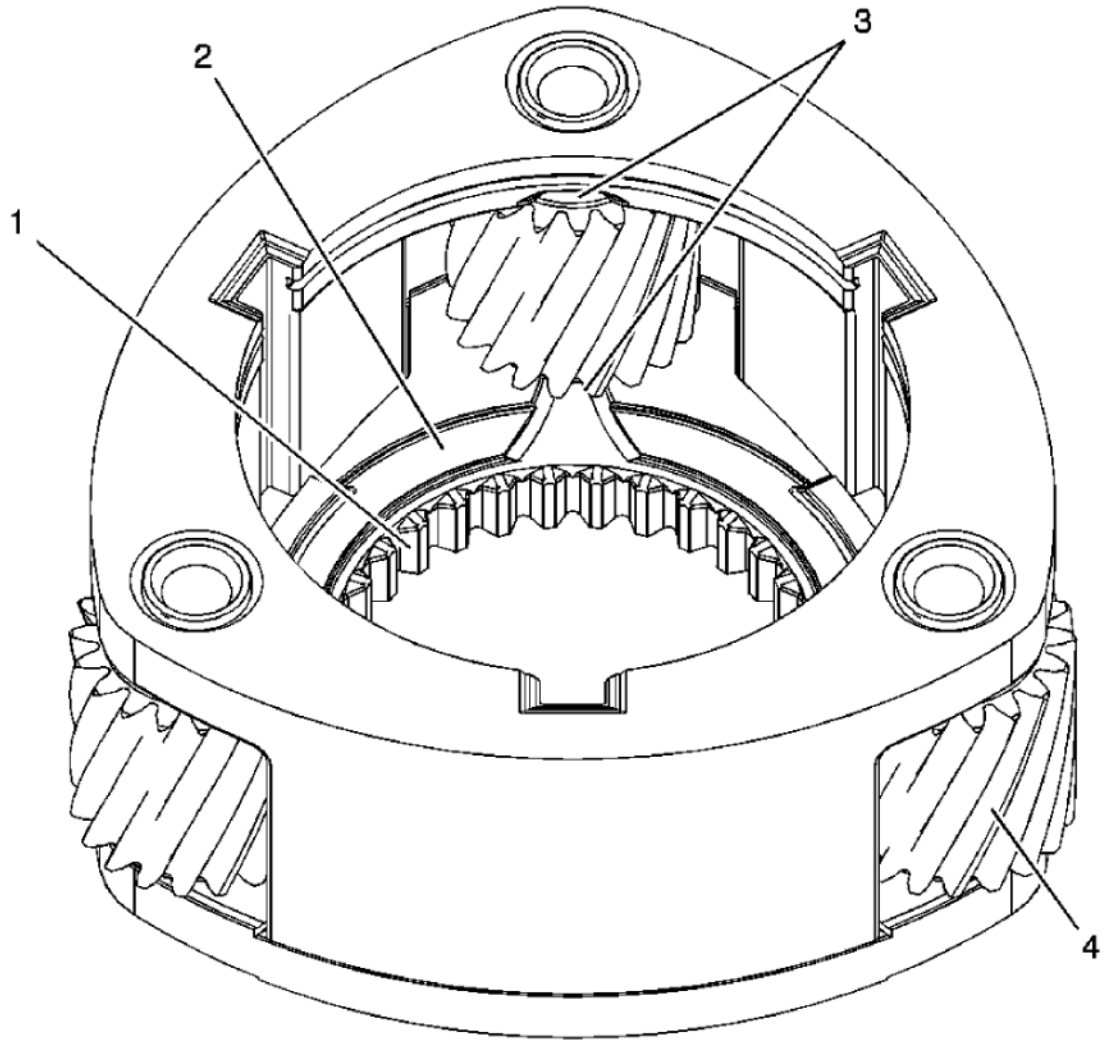


Fig. 33: View Of High/Low Planetary Carrier Inspection Points
Courtesy of GENERAL MOTORS CORP.

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

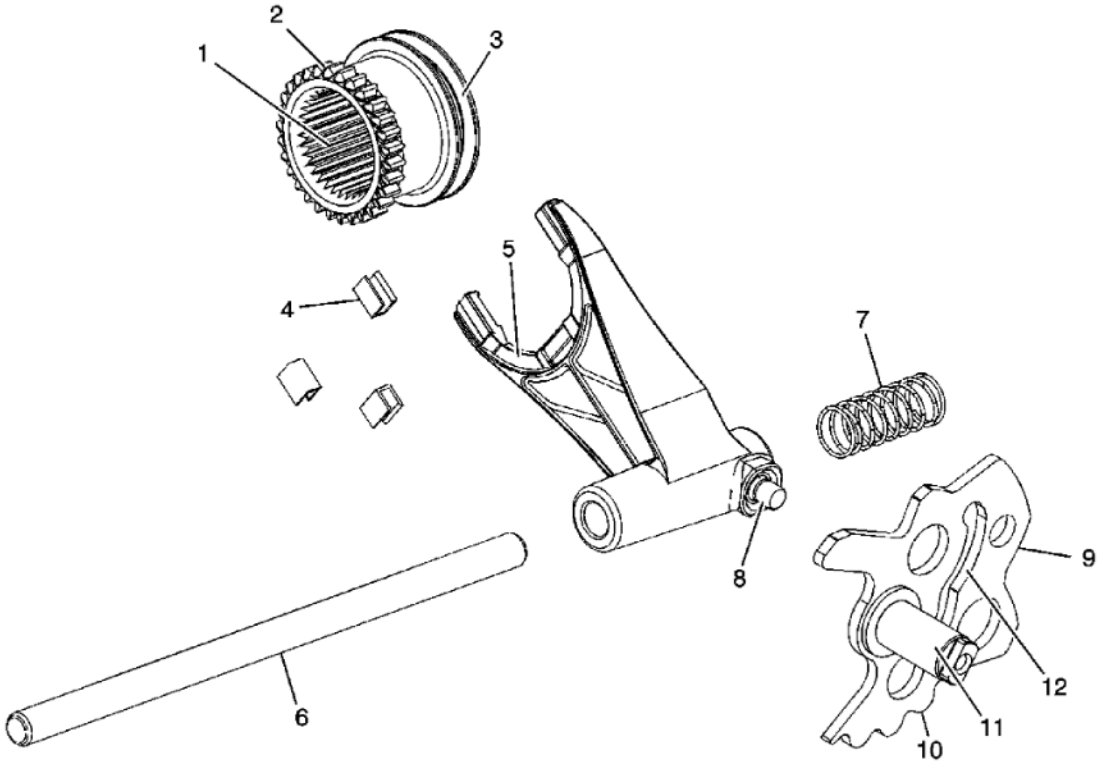


Fig. 34: View Of High/Low Shift Components Inspection Points
Courtesy of GENERAL MOTORS CORP.

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 Inserts **Tip:** Inspect the inserts 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.
6	Transfer Case Control Actuator Shaft **Tip:** Inspect the shaft for straightness.
7	Transfer Case Shift Fork Spring **Tip:** Inspect the spring for breakage.
8	Transfer Case High/Low Shift Fork Pin **Tip:** Inspect the pin for wear.
9	Transfer Case Two/Four Wheel Drive Mode Cam Lobes **Tip:** Inspect the cam lobes for wear or roughness.
10	Transfer Case Shift Detent Plunger Cam Lobes **Tip:** Inspect the cam lobes for wear or roughness.
11	Transfer Case Shift Detent Lever Shaft **Tip:** Inspect for scoring, brinelling, pitting, or excessive wear.

12	Transfer Case High/Low Shift Fork Cam Lobes **Tip:** Inspect the cam lobes for wear or roughness.

TWO/FOUR WHEEL DRIVE SHIFT COMPONENTS CLEANING AND INSPECTION

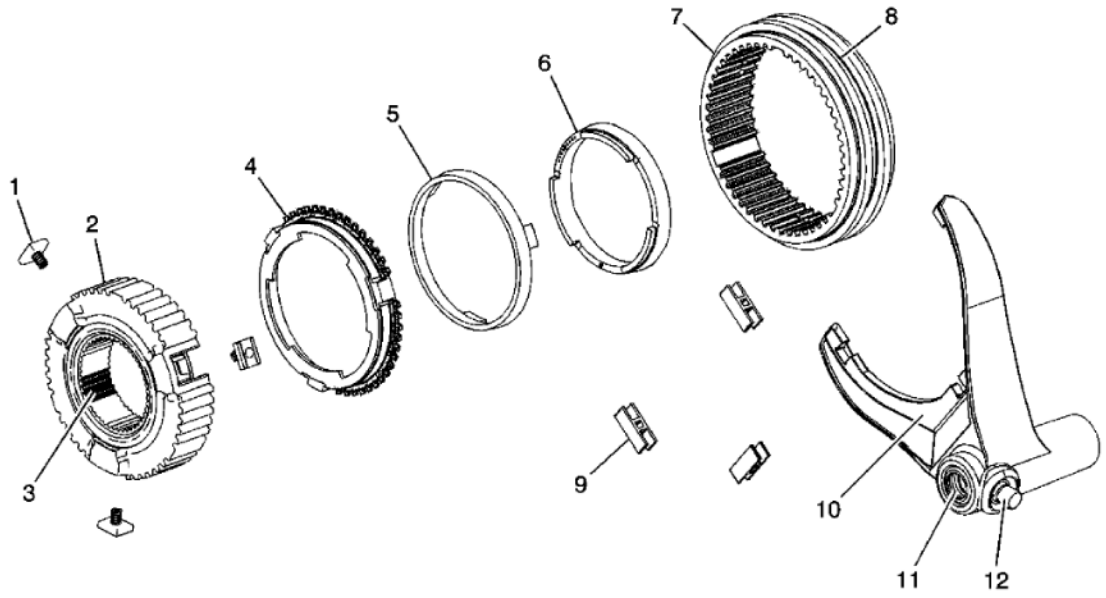


Fig. 35: View Of Two/Four Wheel Drive Shift Component Inspection Points
Courtesy of GENERAL MOTORS CORP.

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 Two/Four Wheel Drive Synchronizer Insert **Tip:** Inspect the inserts for wear.
2	Transfer Case Two/Four Wheel Drive Synchronizer Hub Engagement Teeth **Tip:** Inspect the engagement teeth for wear.
	Transfer Case Two/Four Wheel Drive

3	Synchronizer Hub Splines **Tip:** Inspect the splines for loose fit on the rear output shaft.
4	Transfer Case Two/Four Wheel Drive Synchronizer Assembly **Tip:** Inspect the synchronizer for wear or chipped teeth.
5	Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring - Outer **Tip:** Inspect the synchronizer ring for wear, damage, or missing material.
6	Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring - Inner **Tip:** Inspect the synchronizer ring for wear or roughness.
7	Transfer Case Two/Four Wheel Drive Synchronizer Sleeve Engagement Teeth **Tip:** Inspect the engagement teeth for wear.
8	Transfer Case Two/Four Wheel Drive Synchronizer Sleeve Collar **Tip:** Inspect the collar for wear.
9	Transfer Case Two/Four Wheel Drive Shift Fork Inserts **Tip:** Inspect the inserts for wear.
10	Transfer Case Two/Four Wheel Drive Shift Fork Assembly **Tip:** Inspect for cracks, broken areas, or other damage. The component must be replaced if damage is found.
11	Transfer Case Two/Four Wheel Drive Shift Fork Bearings **Tip:** Replace the shift fork if roughness or pitting is detected.
12	Transfer Case Two/Four Wheel Drive Shift Fork Pin **Tip:** Replace the shift fork if the pin is worn.

REAR OUTPUT SHAFT BUSHING REPLACEMENT

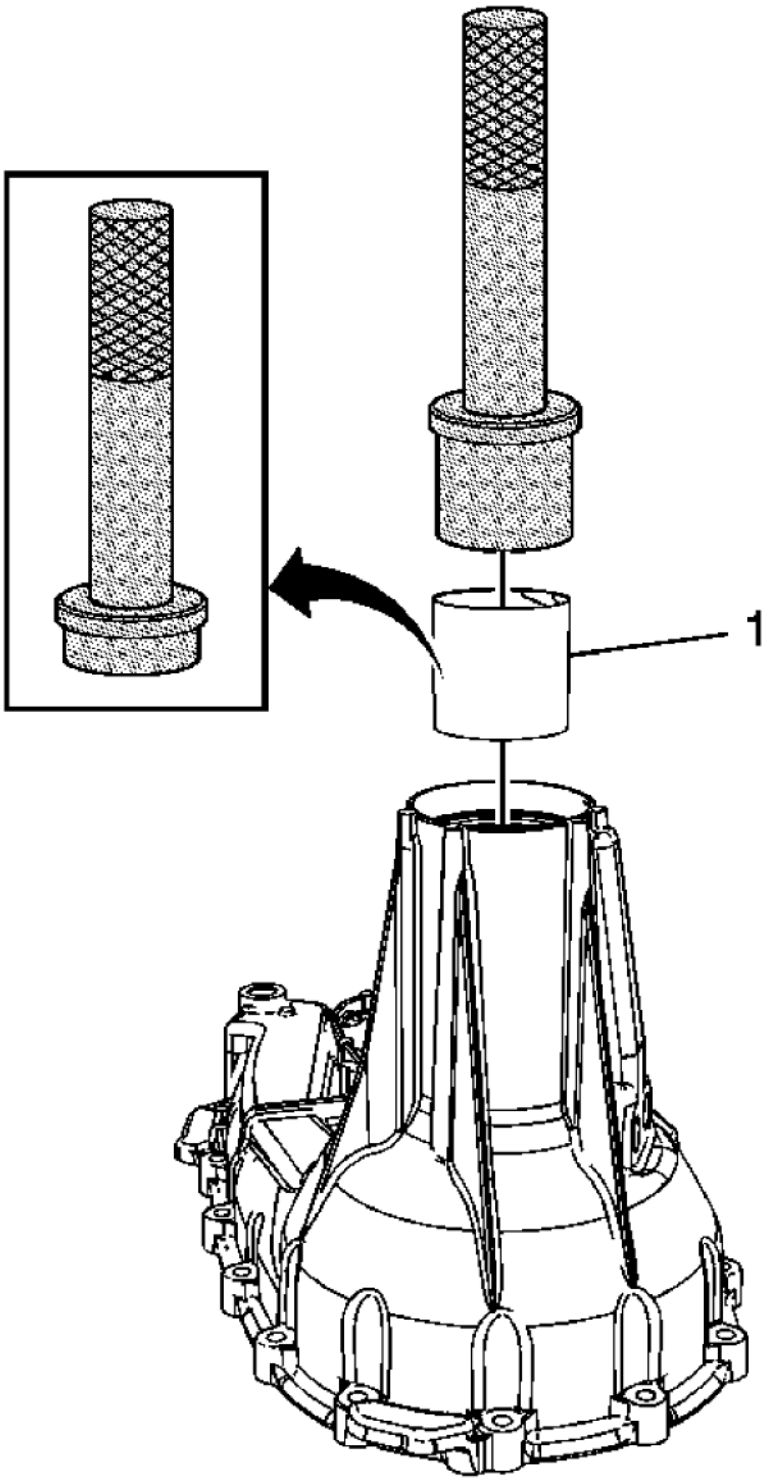


Fig. 36: View Of Rear Output Shaft Bushing
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Ensure the bushing is installed squarely into the bushing bore.	
1	Transfer Case Rear Output Shaft Bushing **Tip:** Press the bushing until the tool bottoms on the rear case half. **Special Tools** • **J 8092** Driver Handle • **DT-48022** Output Bushing Installer. See **Special Tools**. • **DT-48209** Bushing Remover. See **Special Tools**.

SHIFT DETENT LEVER BEARING REPLACEMENT

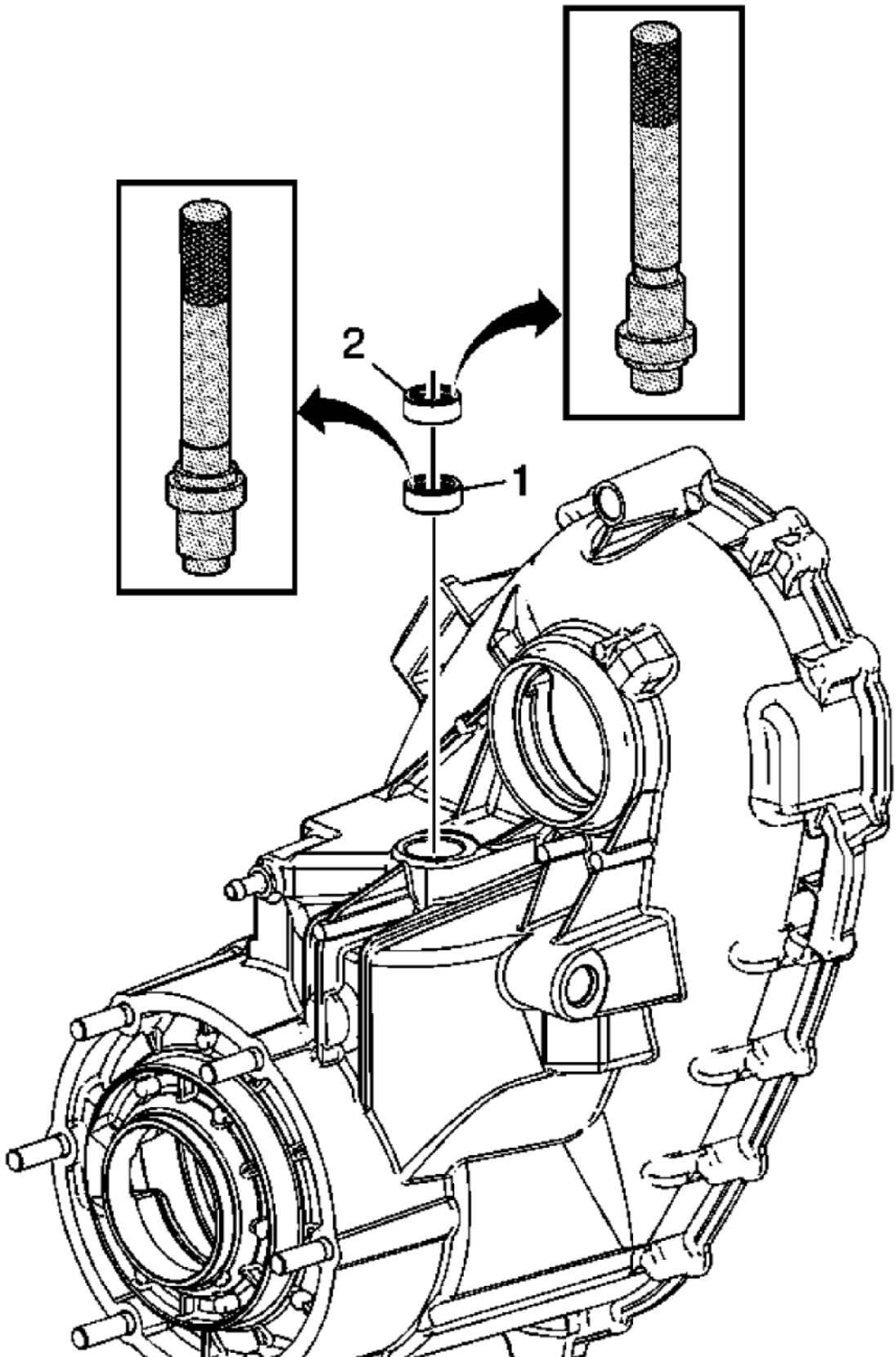

2
1

Fig. 37: View Of Inner & Outer Shift Detent Lever Bearings
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure • Using the **J 7079-2** , remove the bearings from the front case half. See **Special Tools**. • Ensure the bearings are installed squarely into the bearing bores.	
1	Transfer Case Shift Detent Lever Bearing - Inner **Tip:** • Ensure the printing on the bearing is facing upward. • Install the bearing using the long side of the **DT-48215** . See **Special Tools**. • Press the bearing until the tool bottoms on the front case half. **Special Tools** • **DT-48215** Shift Detent Lever Bearing Installer. See **Special Tools**. • **J 7079-2** Universal Driver Handle - Non-Threaded. See **Special Tools**.
2	Transfer Case Shift Detent Lever Bearing - Outer **Tip:** • Ensure the printing on the bearing is facing upward. • Install the bearing using the short side of the **DT-48215** . See **Special Tools**. • Press the bearing until the tool bottoms on the front case half. **Special Tools** • **DT-48215** Shift Detent Lever Bearing Installer. See **Special Tools**.

	• **J 7079-2** Universal Driver Handle - Non-Threaded. See **Special Tools**.

INPUT SHAFT PILOT BEARING REPLACEMENT (LIGHT DUTY)

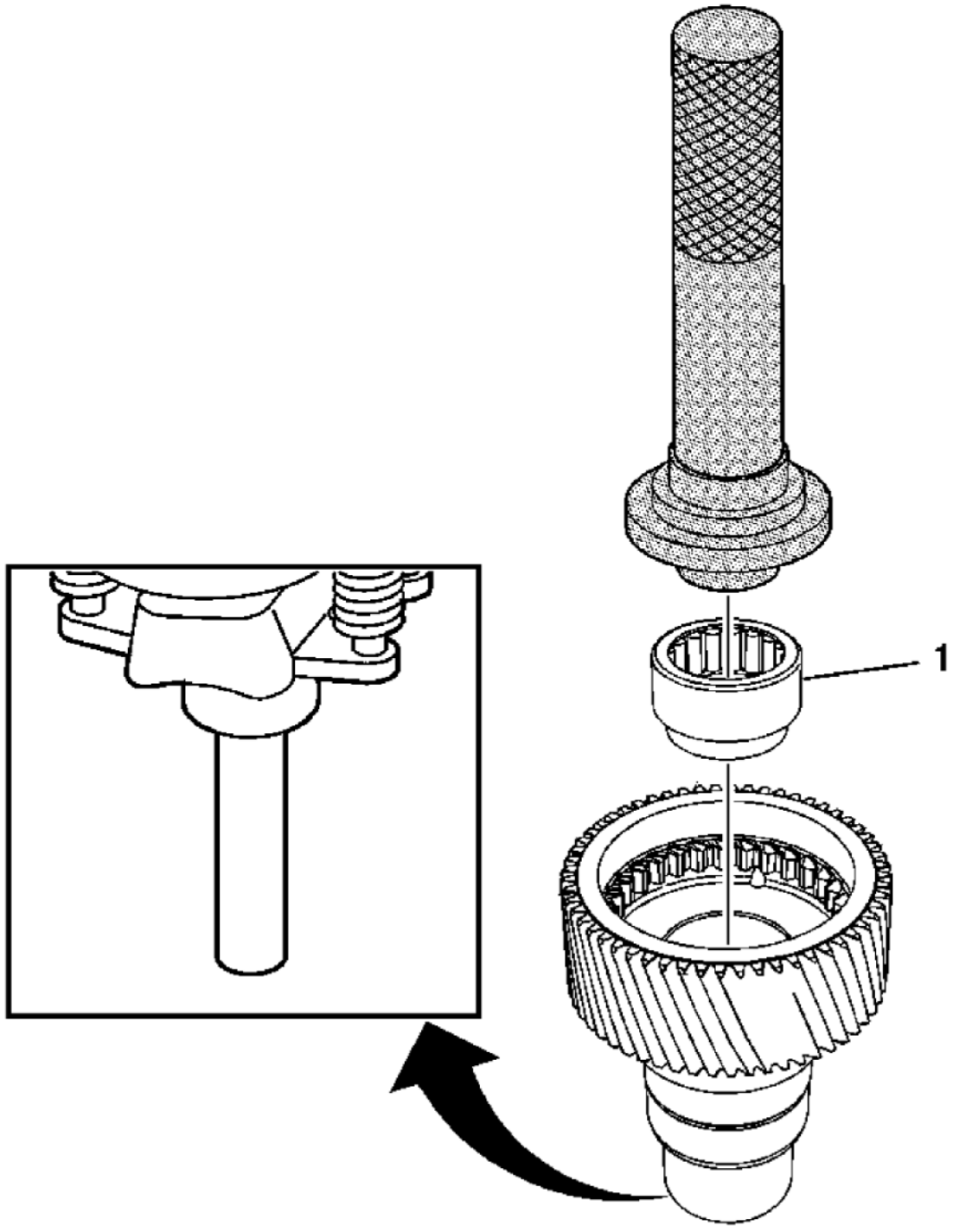


Fig. 38: View Of Transfer Case Input Shaft Pilot Bearing
Courtesy of GENERAL MOTORS CORP.

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** . See **Special Tools**. • Press the bearing until the tool bottoms on the input shaft. **Special Tools** • **DT-48212** Input Shaft Pilot Bearing Installer. See **Special Tools**. • **J 8092** Driver Handle

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

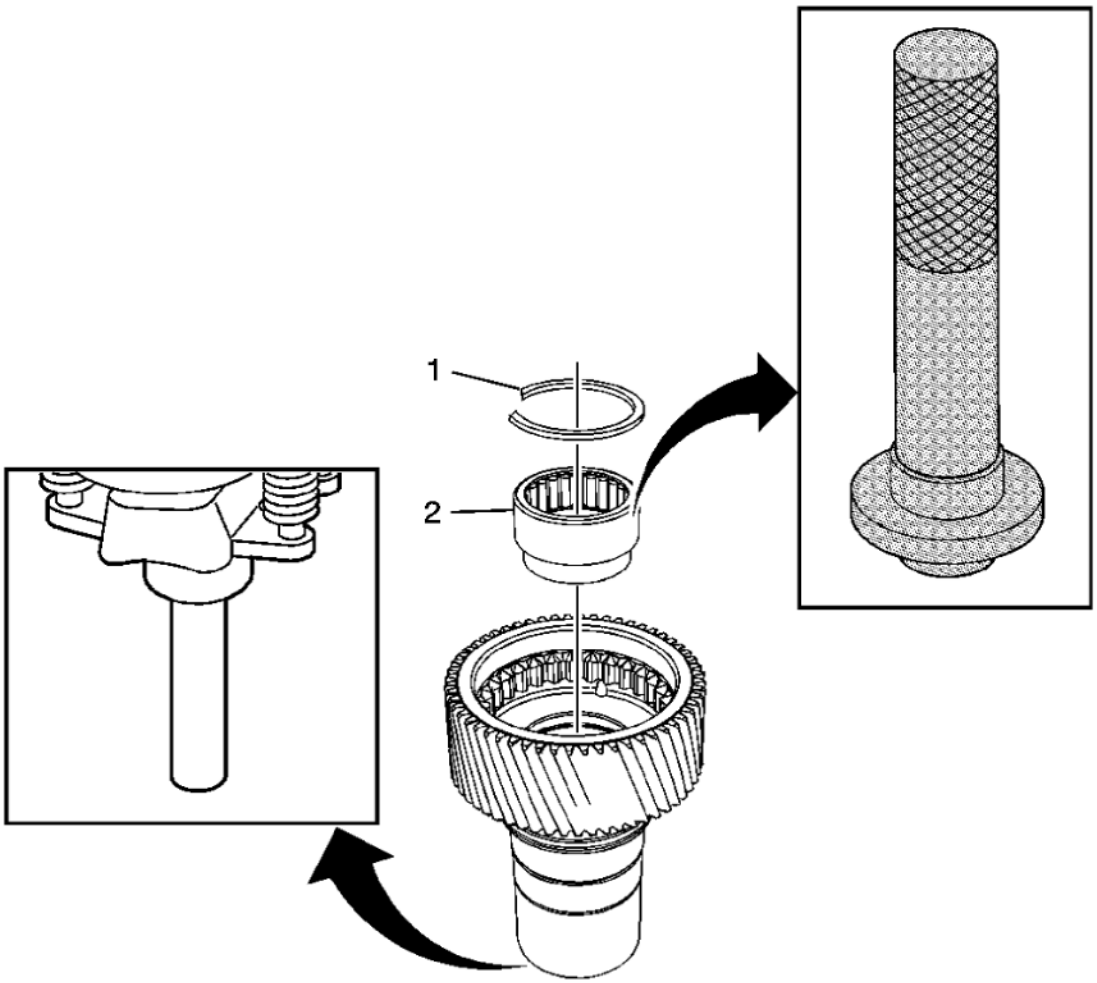


Fig. 39: View Of Input Shaft Pilot Bearing, Retaining Ring & Special Tool
Courtesy of GENERAL MOTORS CORP.

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** . See **Special Tools**. • Press the bearing until the tool bottoms on the input shaft. **Special Tools** • **DT-48212** Input Shaft Pilot Bearing Installer. See **Special Tools**. • **J 8092** Driver Handle

FRONT OUTPUT SHAFT FRONT BEARING REPLACEMENT

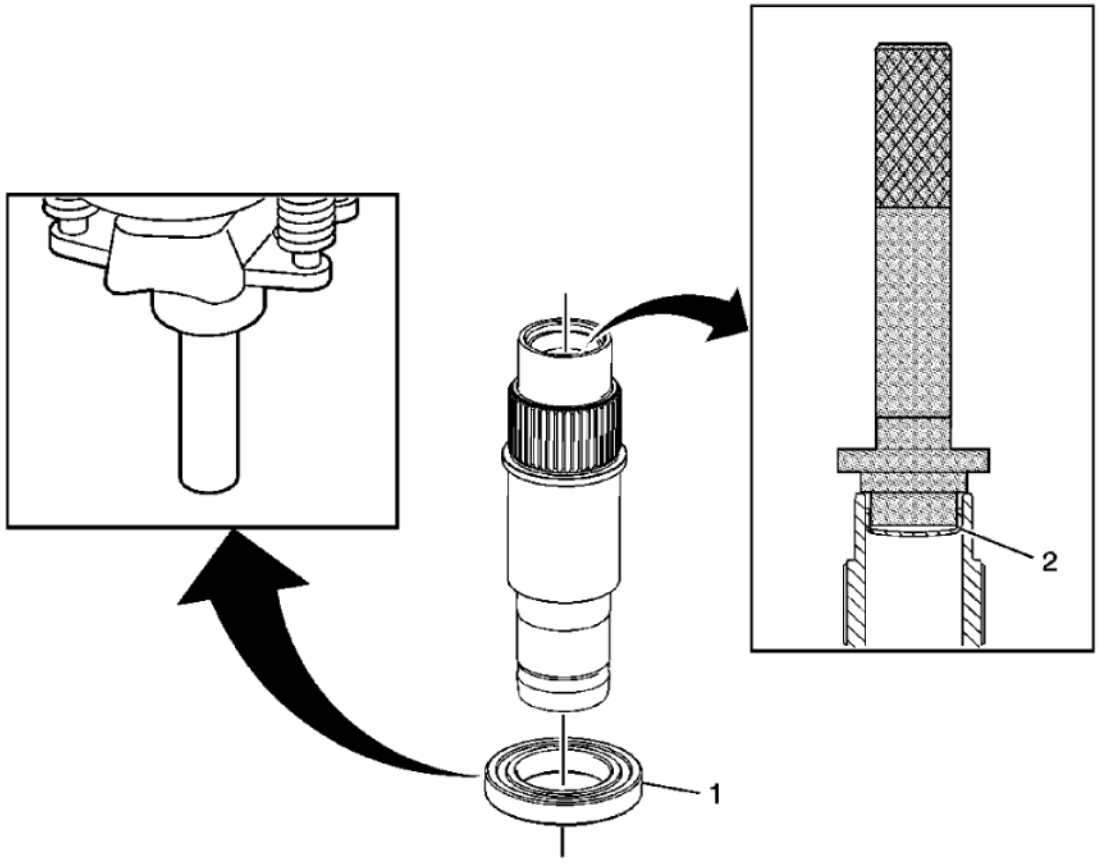


Fig. 40: View Of Front Output Shaft Front Bearing Assembly, Special Tool & Hole Plug

Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure • Ensure the bearing is installed squarely on the front output shaft. • Using a suitable adapter and an arbor press, remove the bearing assembly from the front output shaft.	
1	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.
2	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** . See **Special Tools**. • Press the plug until the tool bottoms on the front output shaft. **Special Tools** • **DT-48212** Input Shaft Pilot Bearing Installer. See **Special Tools**. • **J 8092** Driver Handle

FRONT OUTPUT SHAFT REAR BEARING REPLACEMENT

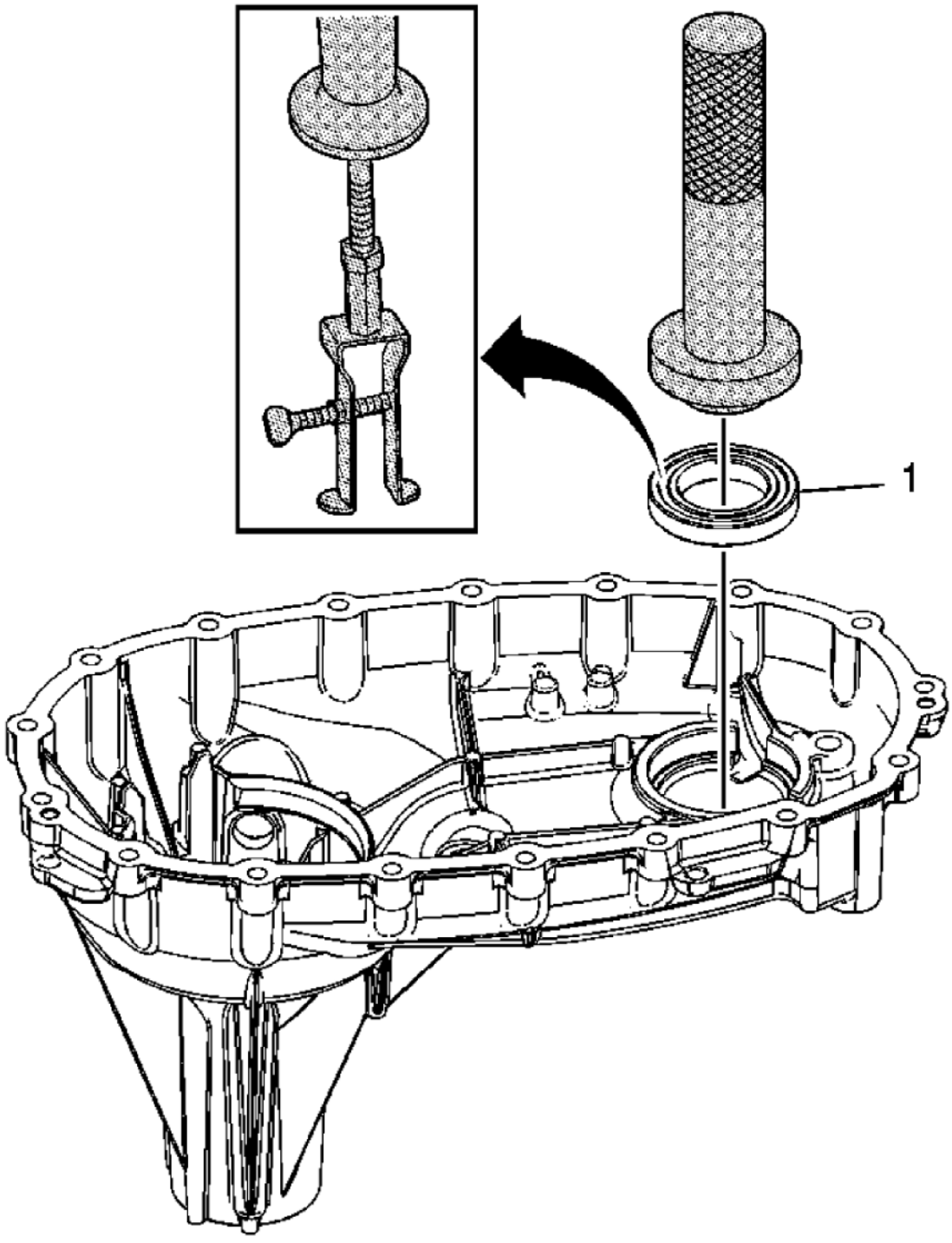


Fig. 41: View Of Front Output Shaft Rear Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

Preliminary Procedure: Ensure the bearing is installed squarely into the bearing bore.	
1	Transfer Case Front Output Shaft Rear Bearing Assembly **Tip:** • A suitable adapter is required to use with the **J 8092** to install. • Press the bearing until the bearing bottoms on the rear case half. **Special Tools** • **J 8092** Driver Handle • **J 23907** Slide Hammer with Bearing Adapter • **J 26941** Bushing and Bearing Remover - 3-4 in

FRONT OUTPUT SHAFT DRIVE SPROCKET BEARING REPLACEMENT

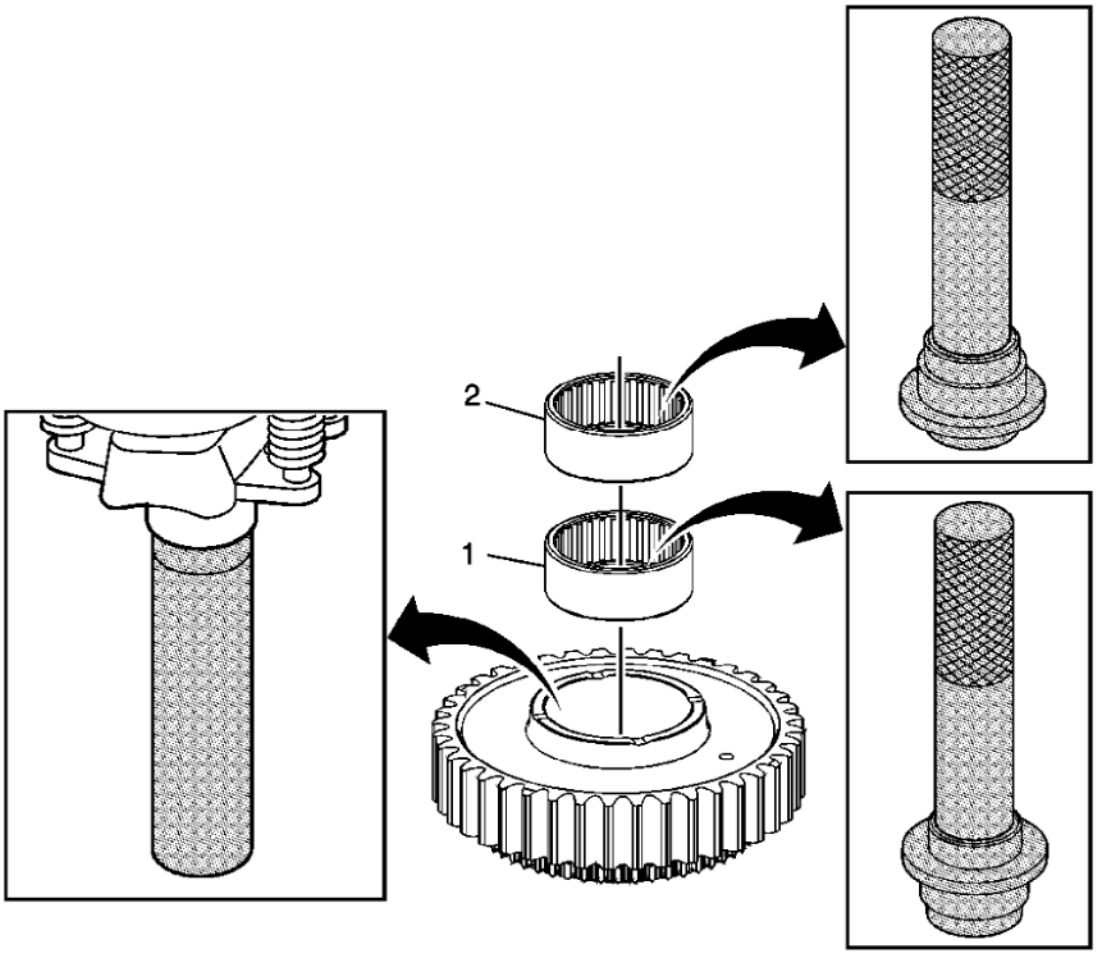


Fig. 42: View Of Front Output Shaft Drive Sprocket Bearing Assemblies & Special Tools
Courtesy of GENERAL MOTORS CORP.

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** . See **Special Tools**.

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. See **Special Tools**. • **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** . See **Special Tools**. • 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. See **Special Tools**. • **J 8092** Driver Handle • **J 35512** Inner Pinion Bearing Installer

TRANSFER CASE ASSEMBLE

Shift Detent Plunger Assembly, Shift Detent Lever, Input Shaft, and Planetary Assembly Installation

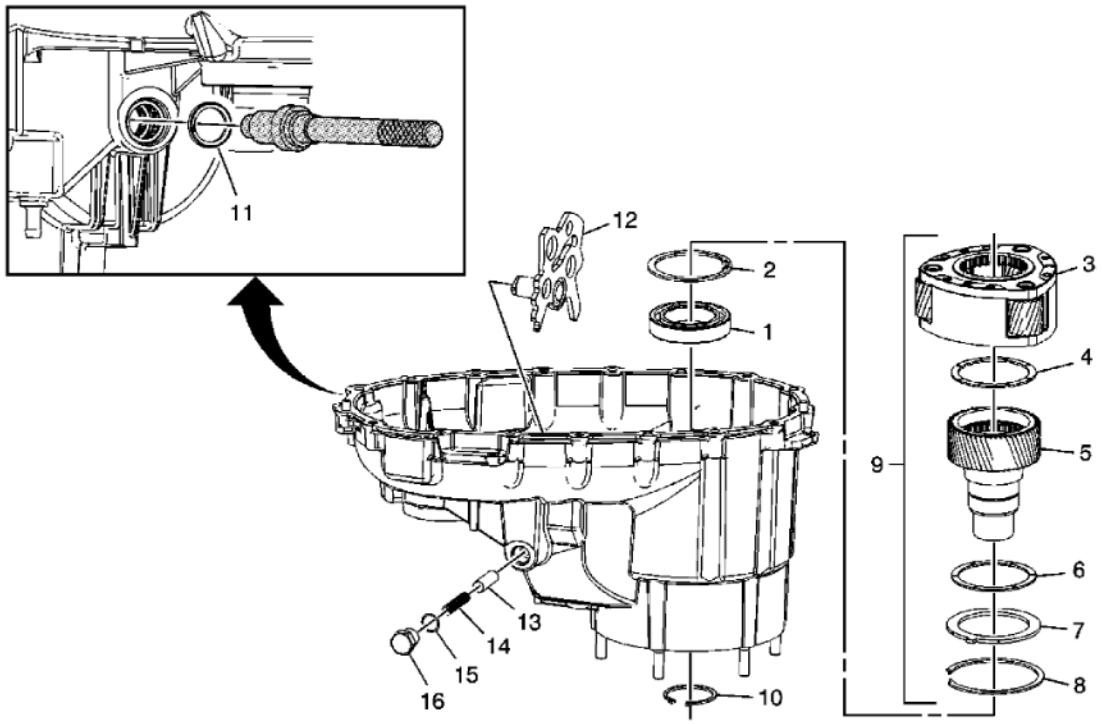


Fig. 43: View Of Shift Detent Plunger Assembly, Shift Detent Lever, Input Shaft, & Planetary Assembly Components
Courtesy of GENERAL MOTORS CORP.

Shift Detent Plunger Assembly, Shift Detent Lever, 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
11	Transfer Case Shift Lever Seal **Tip:** • Lubricate the seal to ease installation. • Ensure the lip on the seal is facing inward. • Ensure the seal is installed squarely into the bore. • Press the seal in, until it contacts the sector bearing. **Special Tools** • **DT-48215** Shift Detent Lever Bearing Installer. See **Special Tools**. • **J 7079-2** Universal Driver Handle - Non-Threaded. See **Special Tools**.
12	Transfer Case Shift Detent Lever Assembly
13	Transfer Case Shift Detent Plunger
14	Transfer Case Shift Detent Spring
15	Transfer Case Shift Detent Plunger Plug Seal **Tip:** Lightly lubricate the O-ring with clean DEXRON®VI.
16	Transfer Case Shift Detent Plunger Plug **Tighten:** 20 N.m (15 lb ft)

Rear Output Shaft Assembly Installation

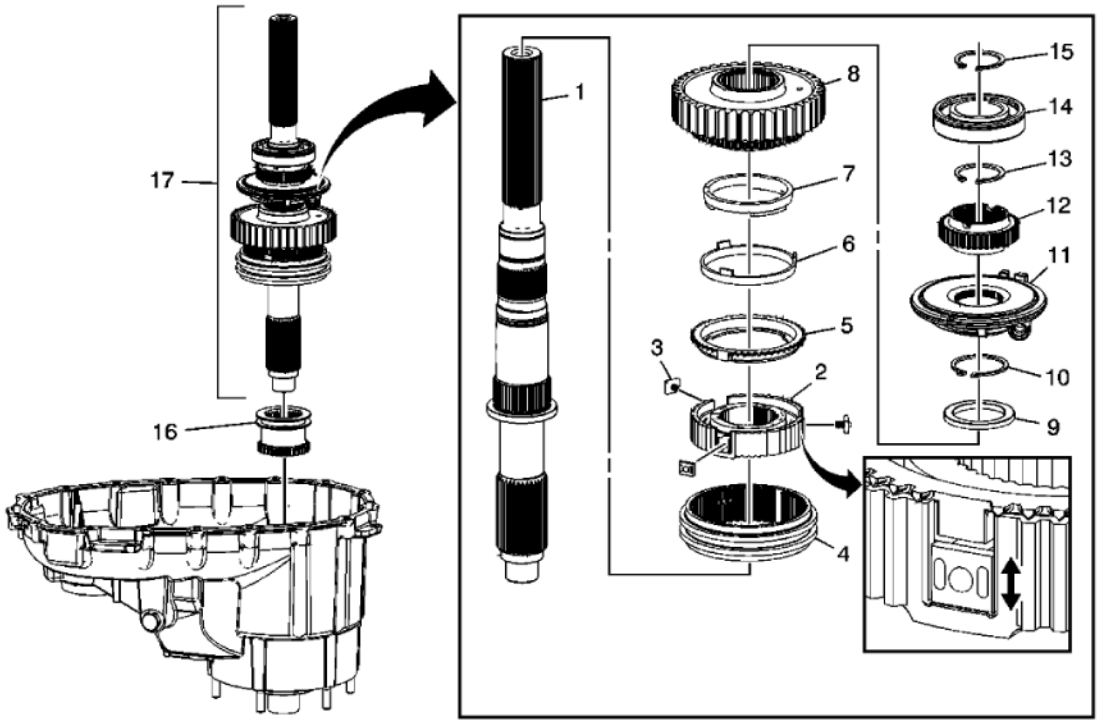


Fig. 44: View Of Rear Output Shaft Assembly Components
Courtesy of GENERAL MOTORS CORP.

Rear Output Shaft Assembly Installation

Callout	Component Name
1	Transfer Case Rear Output Shaft
2	Transfer Case Two/Four Wheel Drive Synchronizer Hub
3	Transfer Case Two/Four Wheel Drive Synchronizer Insert (Qty: 3) **Tip:** Ensure that the inserts are installed in the correct orientation in the synchronizer hub. The inserts should be able to move when correctly installed.
4	Transfer Case Two/Four Wheel Drive Synchronizer Sleeve
5	Transfer Case Two/Four Wheel Drive Synchronizer Assembly
6	Transfer Case Two/Four Wheel Drive Synchronizer Blocking - Outer - Ring

7	Transfer Case Two/Four Wheel Drive Synchronizer Blocking - Inner - Ring
8	Transfer Case Front Output Shaft Drive Sprocket
9	Transfer Case Front Output Shaft Drive Sprocket Spacer - Rear
10	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring
11	Transfer Case Oil Pump Assembly
12	Transfer Case Rear Output Shaft Speed Reluctor Wheel
13	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
14	Transfer Case Rear Output Shaft Rear Bearing Assembly **Tip:** • Use an arbor press or a 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.
15	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
16	Transfer Case High/Low Clutch
17	Transfer Case Rear Output Shaft Assembly

Shift Forks Installation

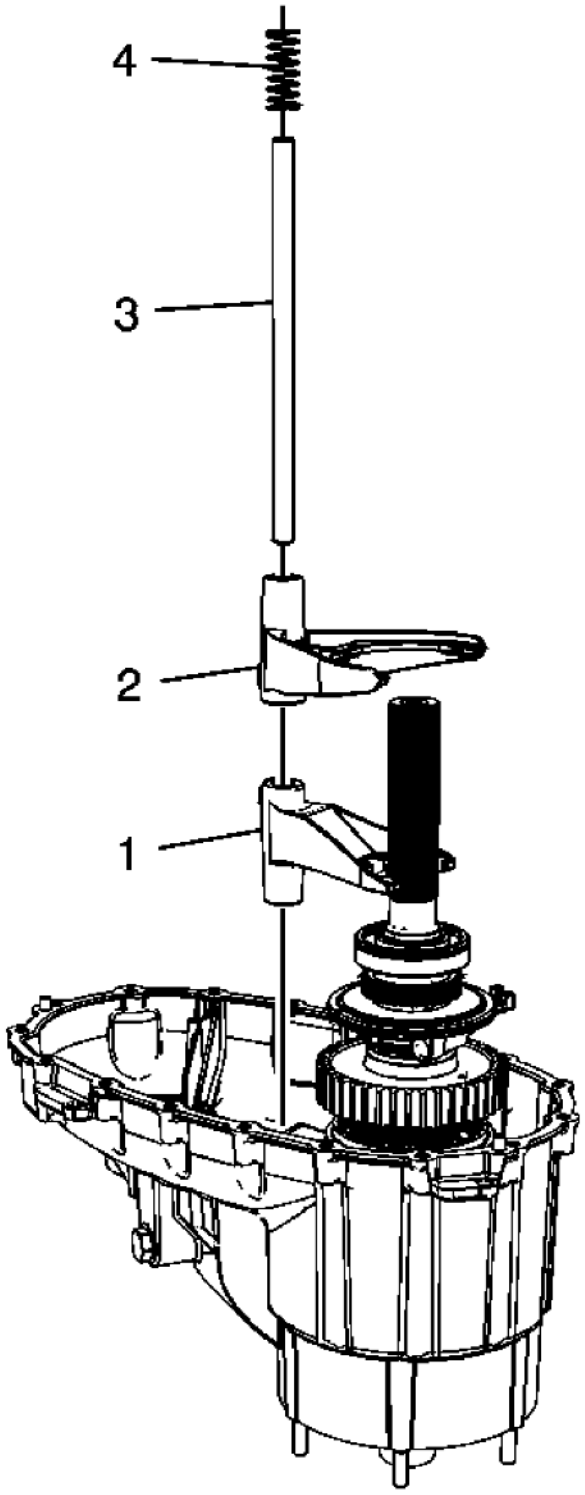


Fig. 45: View Of Shift Fork Components
Courtesy of GENERAL MOTORS CORP.

Shift Forks Installation

Callout	Component Name
1	Transfer Case High/Low Shift Fork
2	Transfer Case Two/Four Wheel Drive Shift Fork Assembly
3	Transfer Case Control Actuator Shaft
4	Transfer Case Shift Fork Spring

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

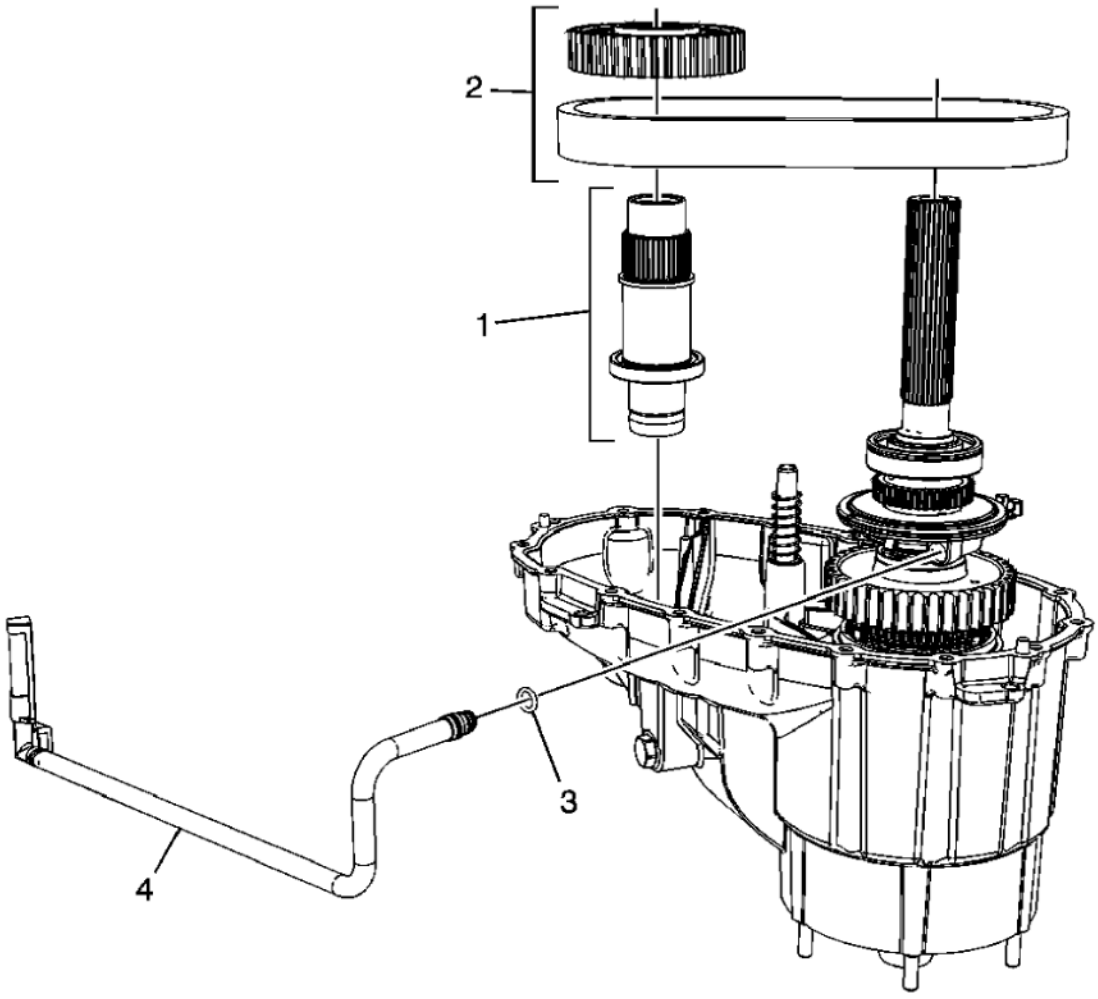


Fig. 46: View Of Front Output Shaft Assembly, Drive Chain & Oil Pump Suction Pipe
Courtesy of GENERAL MOTORS CORP.

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

Callout	Component Name

1	Transfer Case Front Output Shaft Assembly
2	Transfer Case Front Output Shaft Drive Chain Assembly, Transfer Case Front Output Shaft Driven Sprocket **Tip:** • Install the chain with the darkened links facing up. • Engage the driven sprocket to the chain. • Install the driven sprocket over the front output shaft assembly while engaging the chain with the drive sprocket.
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

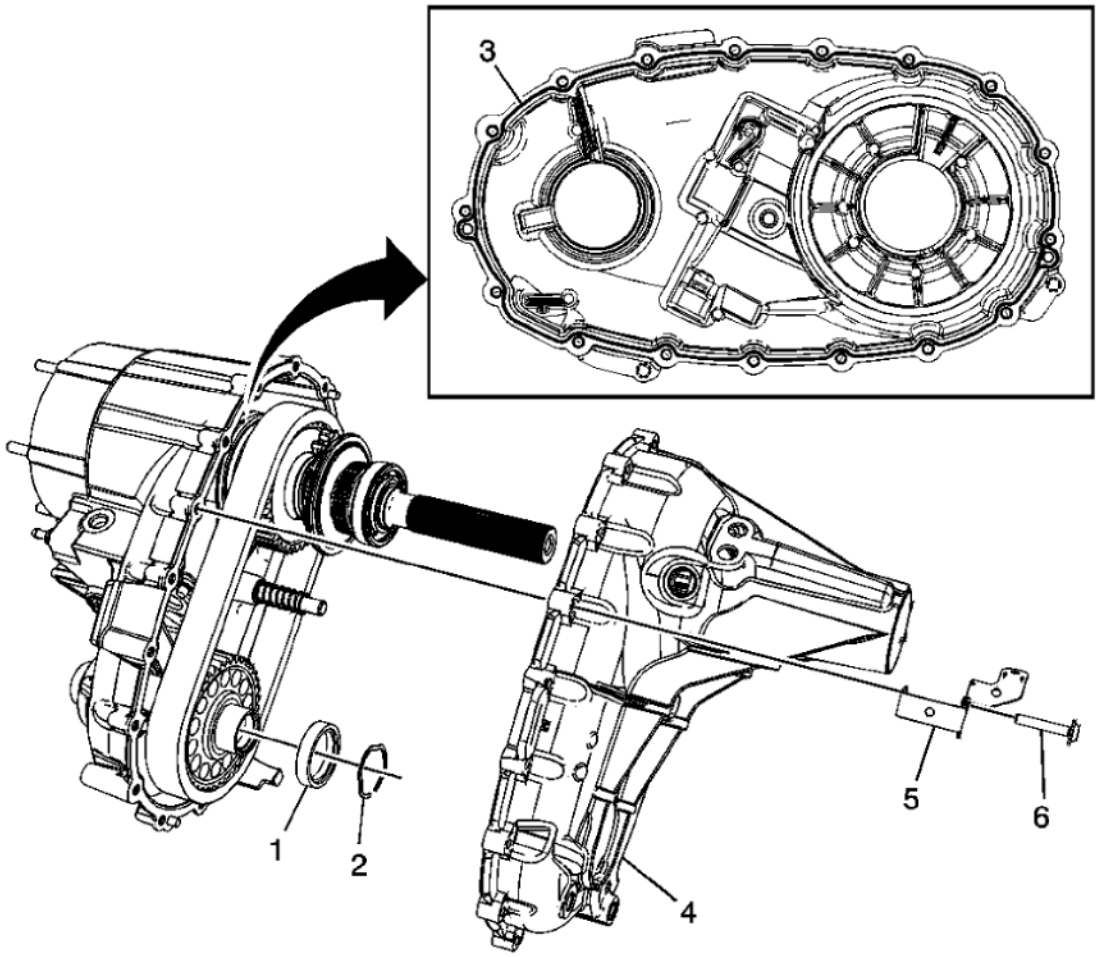


Fig. 47: View Of Transfer Case Rear Case Half Components
Courtesy of GENERAL MOTORS CORP.

Transfer Case Rear Case Half Installation

Callout	Component Name
1	Transfer Case Front Output Shaft Driven Sprocket Spacer
2	Transfer Case Front Output Shaft Driven Sprocket Spacer Spring **Tip:** Ensure the spacer spring is properly positioned into the spacer groove.
	Sealer GM P/N 12345739 (Canadian P/N 10953541) or Equivalent **NOTE:**

3	**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.
4	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.
5	Transfer Case Bracket
6	Transfer Case Bolts (Qty: 17) **NOTE:** **Refer to Fastener Notice .** **Tip:** Tighten the bolts by hand. Do not use an air gun. **Tighten:** 25 N.m (18 lb ft)

Rear Output Shaft Seal and Bushing Installation

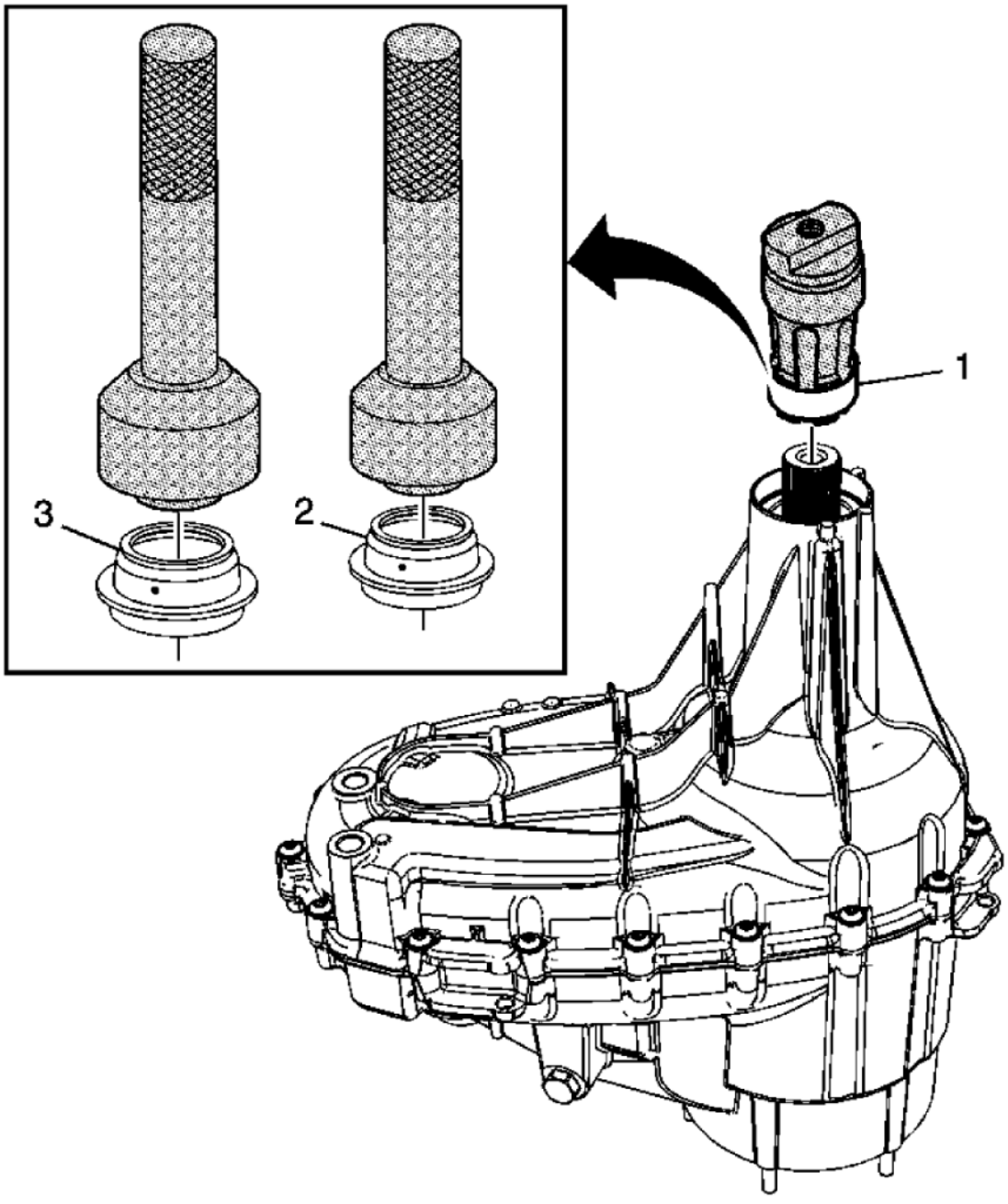


Fig. 48: View Of Rear Output Shaft Bushing, Seals & Special Tools
Courtesy of GENERAL MOTORS CORP.

Rear Output Shaft Seal and Bushing Installation

Callout	Component Name
Preliminary Procedures	

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.

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 above in the Preliminary Procedures for use of the **J 45380** . **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. See **Special Tools**. • **J 8092** Driver Handle
3	Transfer Case Rear Output Shaft Seal (Heavy Duty and Super 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, Lever, Vent, Shift Control Switch, and Vehicle Speed Sensor Installation

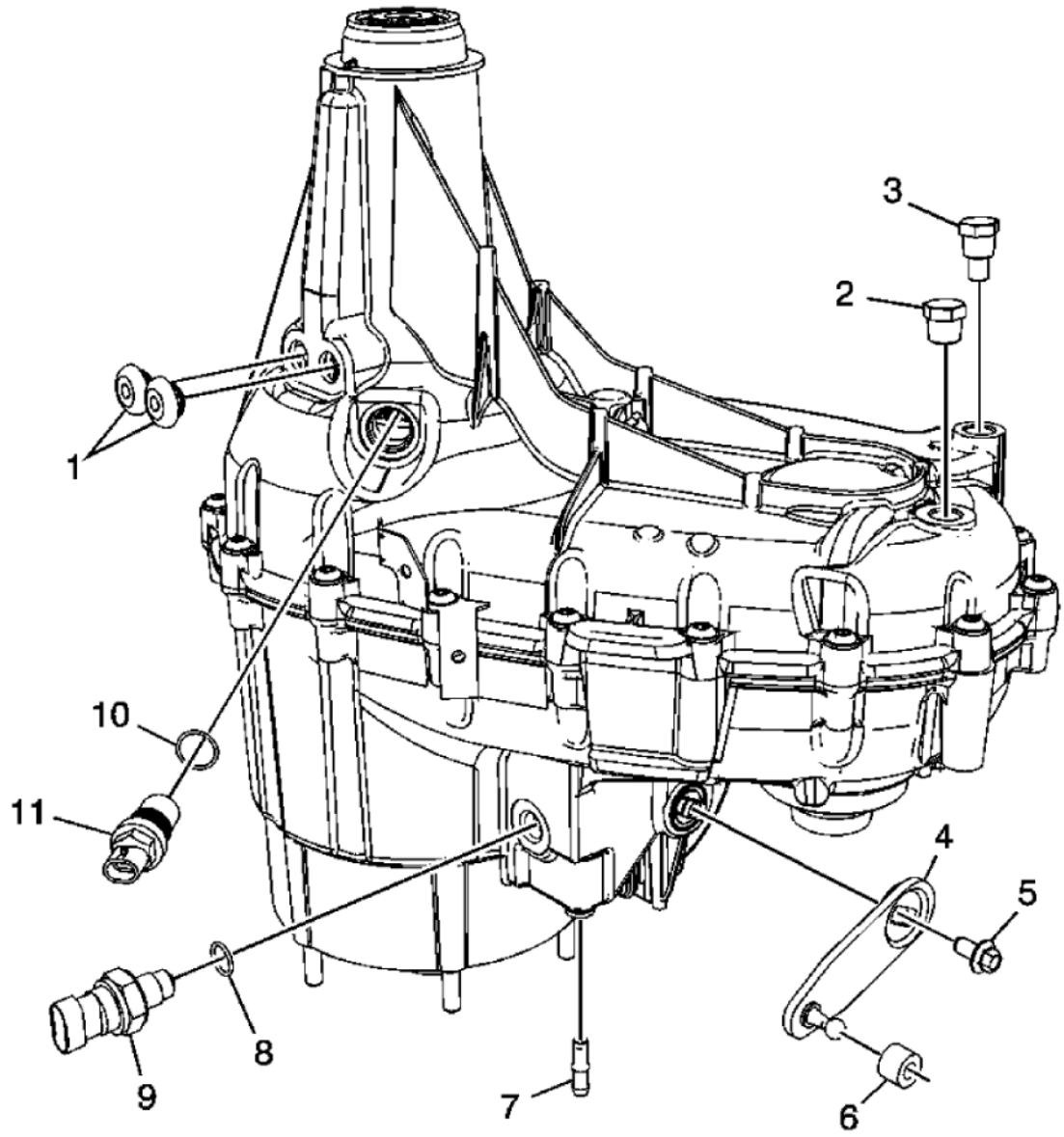


Fig. 49: View Of Access Hole Plugs, Fill & Drain Plug, Lever, Vent, Shift Control Switch, & Vehicle Speed Sensor
Courtesy of GENERAL MOTORS CORP.

Access Hole Plugs, Fill and Drain Plug, Lever, Vent, Shift Control Switch, and Vehicle Speed Sensor Installation

Callout	Component Name
1	Transfer Case Access Hole Plugs (Qty: 2)

2	Transfer Case Oil Fill Plug **NOTE:** **Refer to Component Fastener Tightening Notice .** **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)
3	Transfer Case Oil Drain Plug **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)
4	Transfer Case Lever
5	Transfer Case Control Lever Bolt/Screw **NOTE:** **Refer to Fastener Notice .** **Tip:** Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489) to the control lever bolt before installation. **Tighten:** 27 N.m (20 lb ft)
6	Transfer Case Shift Lever Washer
7	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.
8	Transfer Case Selector Switch - O-Ring - Seal **Tip:** Lightly lubricate the O-ring with clean DEXRON®VI.
9	Transfer Case Shift Control Switch Assembly

	Tighten: 27 N.m (20 lb ft)
10	Vehicle Speed Sensor O-Ring Seal **Tip:** Lightly lubricate the O-ring with clean DEXRON®VI.
11	Vehicle Speed Sensor Assembly **Tighten:** 17 N.m (13 lb ft)

Input Shaft Seal and Front Output Shaft Seal Installation

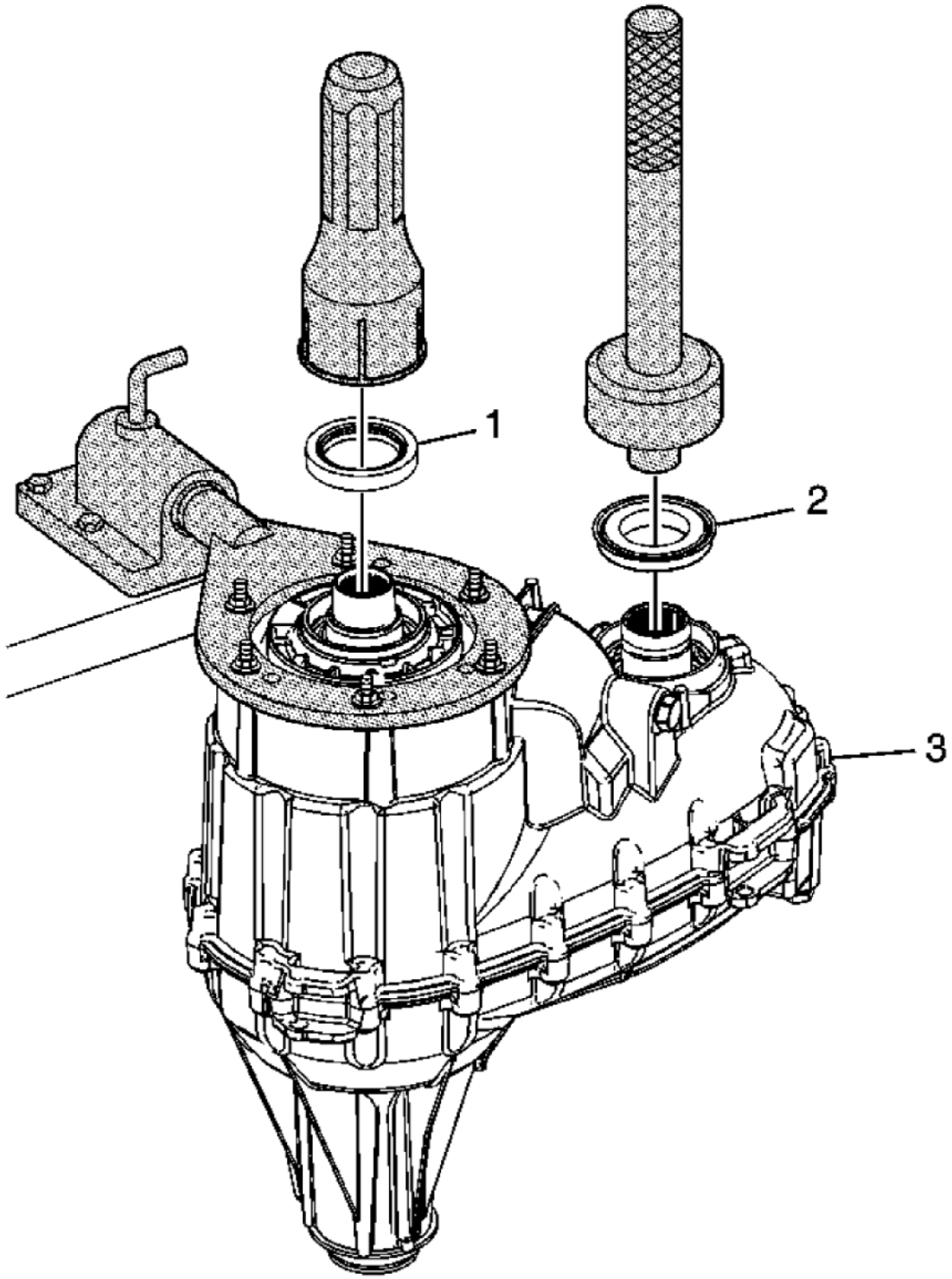


Fig. 50: View Of Input Shaft Seal & Front Output Shaft Seal
Courtesy of GENERAL MOTORS CORP.

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. **Special Tools** • **J 3289-20** Holding Fixture • **J 45759** Assembly Fixture

DESCRIPTION AND OPERATION

TRANSFER CASE IDENTIFICATION

TRANSFER CASE IDENTIFICATION (MAGNA)

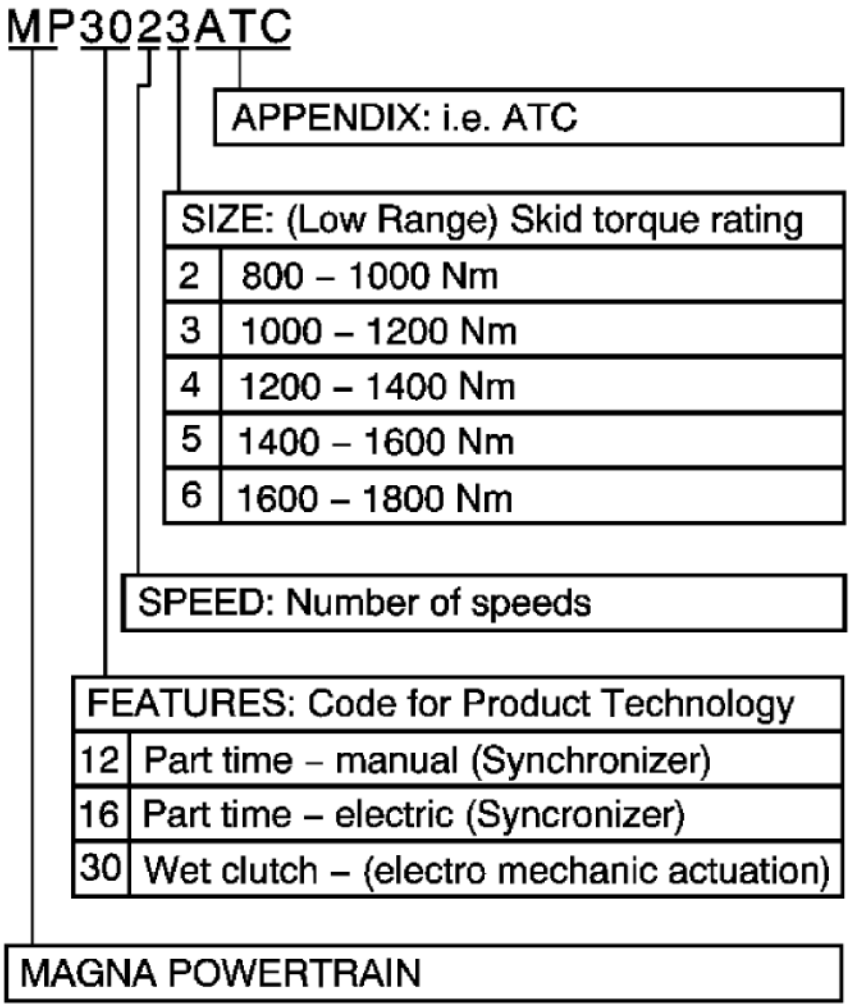


Fig. 51: Transfer Case I.D. Label
Courtesy of GENERAL MOTORS CORP.



Fig. 52: 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) 1222/1225/1226, RPO NQG transfer case is a 2-speed, part-time with mode shift-on-the-fly capability. It has a chain driven front output shaft and an epicyclical low range planetary arrangement. The MP 1222/1225/1226 transfer case features a 4 position shift lever control located in the vehicle floor plan. As required, the operator can select 4HI position from 2HI on-the-fly, as described in the owners manual. A dash mounted 4WD lamp continues flashing during shifting, until all criteria have been met and the new mode/range position has been reached. Once the new mode/range position is fully engaged and the front axle disconnect locks in, the dash light 4WD indicator lamp remains ON constantly. Range shifting functions similarly, although it should be limited to speeds 5 km/h (3 mph) or less.

The 4 manual mode, or range gear positions, of the MP 1222/1225/1226 transfer case are:

- 2HI - 2 wheel drive high range
- 4HI - 4 wheel drive high range, part-time
- 4LO - 4 wheel drive low range, 2.68:1 gear ratio reduction
- N - NEUTRAL, 4 wheel

When the ignition switch is placed in the run position and the 4WD shift lever is in the 4WD position, the transfer case switch closes, supplying a ground to the axle actuator control circuit. With the ground applied, the logic of the front axle actuator actuates a DC motor to engage the front axle and supply voltage to the axle switch signal circuit. The axle switch signal circuit notifies the engine control module (ECM) and the Anti-Lock Brake System that the vehicle is in the 4WD mode. The 4WD indicator is commanded on via a GM LAN serial data signal from the ECM. When the 4WD shift lever is in the 4WD low range position, the transfer case switch closes and supplies a ground on the 4WD low signal circuit. This informs the ECM that the vehicle

transfer case is in low range. When the vehicle is in low range, the transmission control module (TCM) changes the shift pattern of the automatic transmission.

During normal driving situations, the transfer case can operate in the 2WD mode. The driver may choose to select any of the mode/range gear positions while driving the vehicle. However, the transfer case should not be shifted into or out of 4LO unless the following criteria have been met:

- The transmission is in NEUTRAL.
- The vehicle speed is less than 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, providing constant lubrication during towing. Note, this NEUTRAL position is a 4WD NEUTRAL, meaning the front and rear outputs of the transfer case are engaged as though in 4HI. With a disconnecting front axle, there is no power flow to the front wheels, allowing towing with the front wheels off the ground or flat towing without driveline binding. Again, the transfer case should not be shifted into or out of NEUTRAL unless the following criteria have been met:

- The transmission is in NEUTRAL.
- The vehicle speed is less than 5 km/h (3 mph).

The NQG transfer case is available in 3 variations, depending on the engine and transmission configurations. The variations allow the transfer case to handle different torque loads. When servicing the transfer case it is important to understand which variation is being serviced because of the difference in parts.

MP 1222/1225/1226 Variations

Model	Transmission	Input Shaft	Output Shaft	Chain Size	Chain Series	Hi/Low Planetary	Application
MP 1222 Light Duty (LD)	M30 - 4L60-E	27T Spline	32T Spline	7/16 X 1.25 in	9600 Series Rocker Pin Chain	3 Pinion	K1
MP 1225 Heavy Duty (HD)	MYD - 6L90	29T Spline	31T Spline	7/16 X 1.5 in	9600 Series Rocker Pin Chain	5 Pinion	K2
MP 1226 Super	MYD - 6L90				2300		

Heavy Duty (SHD)	MW7 - Allison	29T Spline	31T Spline	7/16 X 1.5 in	Series Round Pin Chain	5 Pinion	K2, K3

All Canadian MP1225 Transfer Cases will be equipped with the 2300 series round pin chain.

Additional differences in these models are listed below:

MP1222

- The input shaft seal is a dual lip seal used with wet cavity adapters.
- The input shaft pilot bearing assembly is smaller to accommodate the smaller rear output shaft, the outer diameter measures 38.1 mm (1.5 in).
- The high/low clutch has bias pointing engagement teeth, the leading edge of the teeth are not symmetric.
- The rear output shaft is smaller.
- The front output shaft drive sprocket is 31.75 mm (1.25 in) wide.
- The front output shaft driven sprocket is 31.75 mm (1.25 in) wide.
- The rear output shaft rear bearing retaining rings are smaller, the outer diameter of the ring groove at the rear output shaft measures 37.5 mm (1.476 in)
- The rear output shaft rear bearing assembly is smaller, the inner diameter measures 40 mm (1.575 in).
- The rear output shaft seal is smaller, the inner lip diameter measures 46.2 mm (1.819 in).
- The rear output shaft bushing is smaller, the inner diameter measures 48 mm (1.890 in).
- The rear case half has smaller bores to accommodate the rear output shaft seal and the rear output shaft bushing.

MP 1225

The input shaft seal is a single lip seal used only with dry cavity adapters.

MP 1226

The input shaft seal is a dual lip seal used specifically for the MW7 which has a wet cavity adapter, these seals are also used for the MYD in order to retain a common part number for this model.

MP 1225/1226

- The input shaft pilot bearing assembly is larger 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 edge of the teeth are symmetric.
- The rear output shaft is larger.
- The front output shaft drive sprocket is 38.1 mm (1.5 in) wide.
- The front output shaft driven sprocket is 38.1 mm (1.5 in) wide.
- The rear output shaft rear bearing retaining rings are larger, the outer diameter of the ring groove at the rear output shaft measures 38.5 mm (1.516 in).
- The rear output shaft rear bearing assembly is larger, the inner diameter measures 41 mm (1.614 in).
- The rear output shaft seal is larger, the inner lip diameter measures 54.2 mm (2.134 in).
- The rear output shaft bushing is larger, the inner diameter measures 56.08 mm (2.208 in).
- The rear case half has larger bores to accommodate the rear output shaft seal and the rear output shaft bushing.

2WD Mode Power Flow

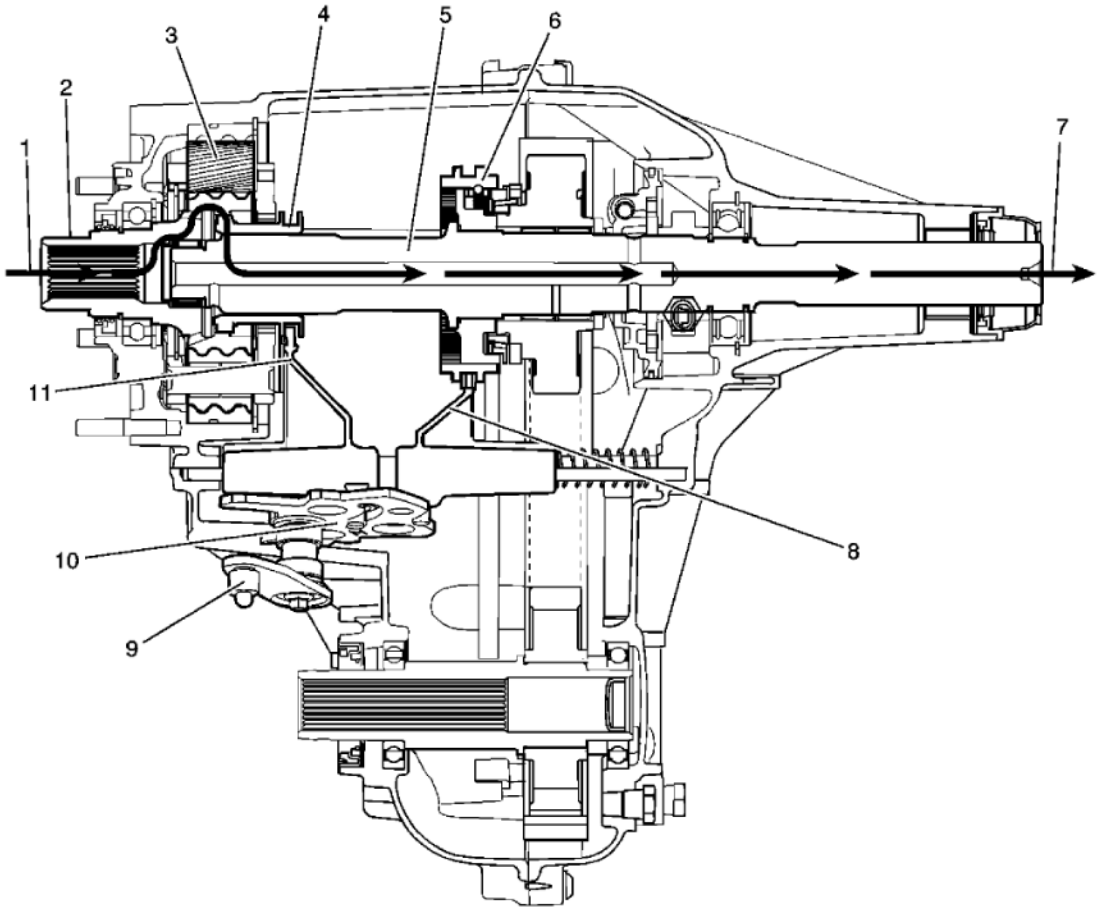


Fig. 53: 2WD Mode Power Flow
Courtesy of GENERAL MOTORS CORP.

The transfer case is shifted by a remote mounted shift lever, which is connected by linkage to the shift lever (9) on the shift detent lever shaft. The shift detent lever shaft rotates the cam shaped shift detent lever assembly (10) and moves the high/low range shift fork (11) or the 2/4 wheel drive mode shift fork (8). Depending on the selected mode or range, the shift forks move either the high/low clutch (4) for the high/low range planetary assembly (3) or the synchronizer sleeve (6) for the 2/4 wheel drive mode. In the 2WD mode, the engine power from the transmission (1) is delivered to the input shaft (2). The engagement teeth on the inside of the input shaft (2) are engaged to the outer teeth on the high/low clutch (4). The high/low clutch (4) is slipped splined to the rear output shaft (5). The engine power flows from the high/low clutch (4) to the rear output shaft (5) and is delivered to the rear propeller shaft (7).

4HI Mode Power Flow

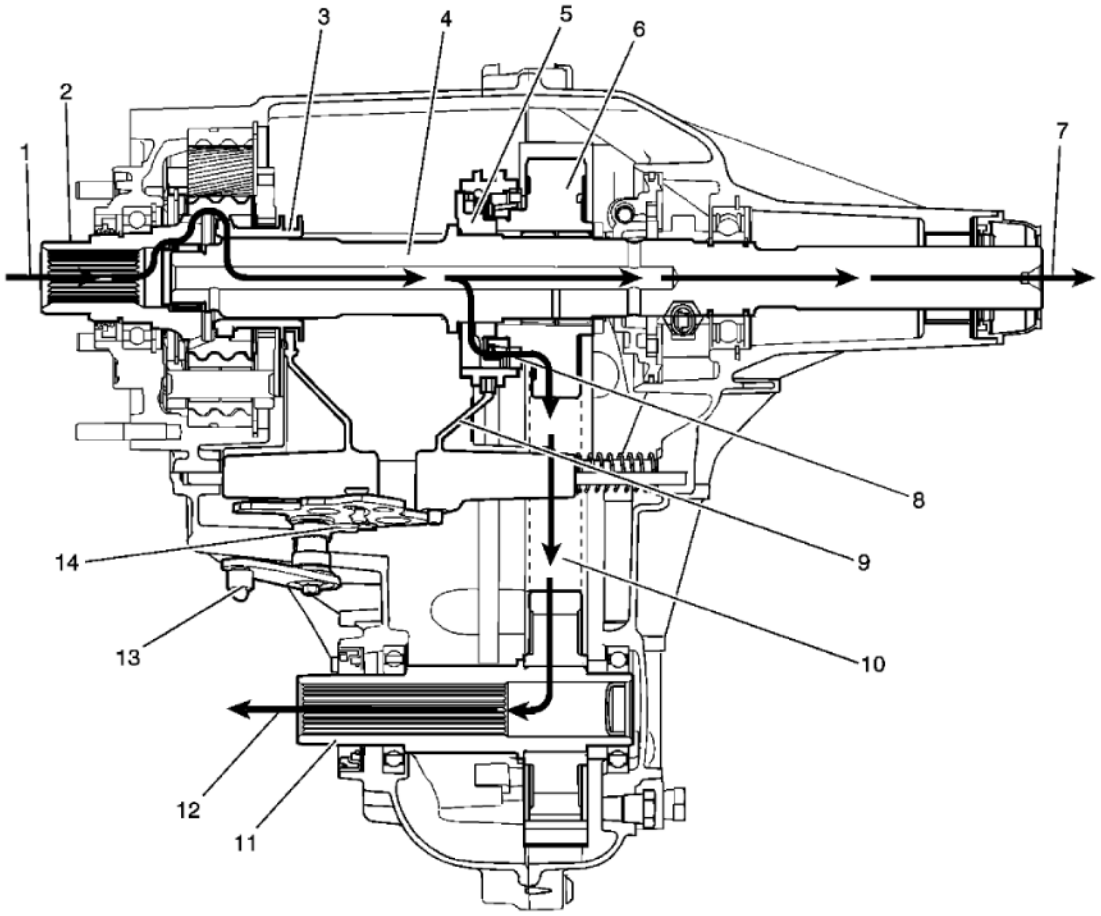


Fig. 54: 4HI Mode Power Flow
Courtesy of GENERAL MOTORS CORP.

In the 4HI mode, the engine power from the transmission (1) is delivered to the input shaft (2). The engagement teeth on the inside of the input shaft (2) are engaged to the outer teeth on the high/low clutch (3). The high/low clutch (3) is slipped splined to the rear output shaft (4). During a shift mode from 2HI to 4HI the cam profile on the shift detent lever assembly (14) pushes the 2/4 wheel drive mode shift fork (9) and the synchronizer sleeve. The sleeve, engaging the synchronizer (8) equalizes the front propeller shaft (12) and rear propeller shaft (7) speeds. Then the sleeve engages to the drive sprocket (6). The engine power flow for driving the front propeller shaft (12), now travels from the rear output shaft (4) to the synchronizer hub (5), which is splined to the rear output shaft (4). The power flows from the synchronizer hub (5) to the sleeve and then to the drive sprocket (6). The power flow is transmitted by a chain (10) to the driven sprocket on the front output shaft (11) and to the front propeller shaft (12). The front and rear propeller shafts are being driven at equal RPM, therefore giving a four wheel drive mode. This mode should only be used for extra traction. Using this mode on dry pavement causes tire scuffing when turning.

4LO Mode Power Flow

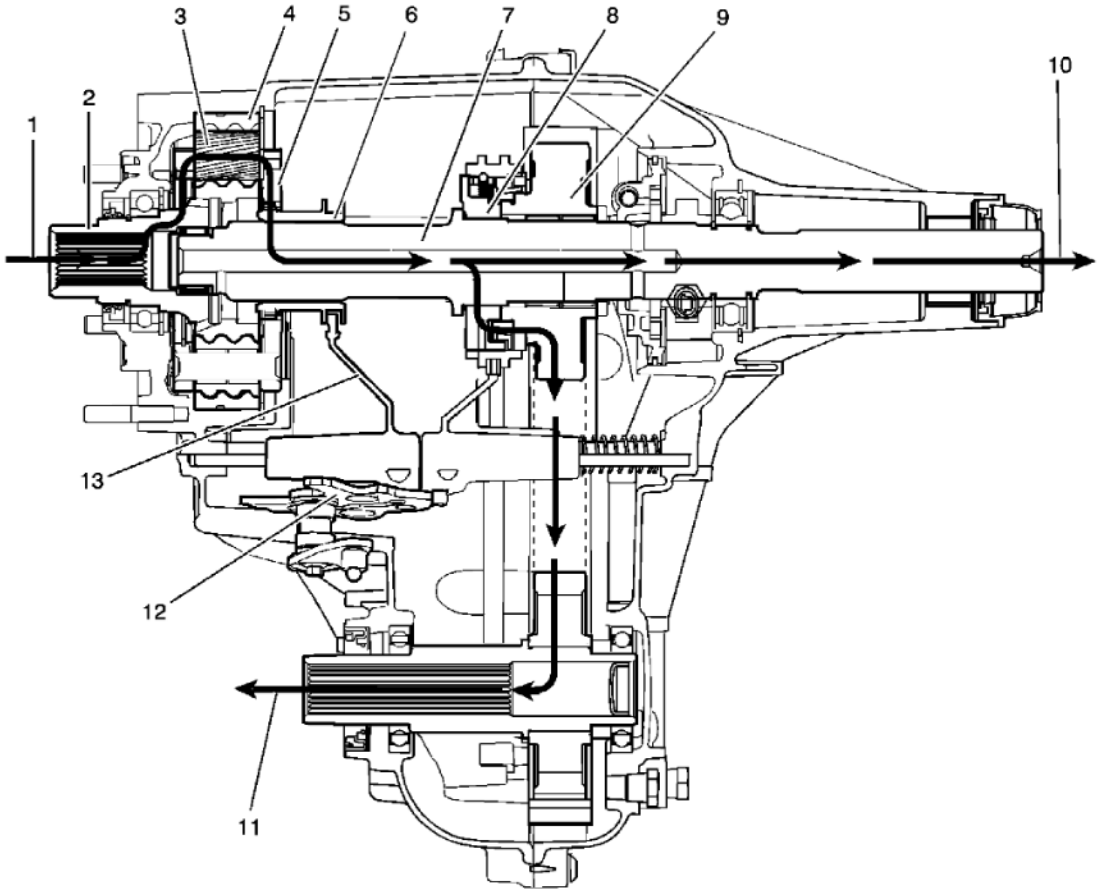


Fig. 55: 4LO Mode Power Flow
Courtesy of GENERAL MOTORS CORP.

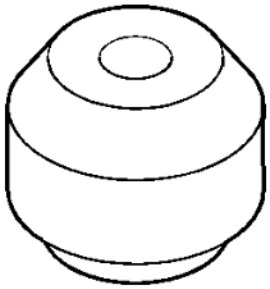
During range shift request to 4LO, a separate cam profile on the same shift detent lever assembly (12) moves the high/low shift fork (13). The high/low shift fork (13) moves the high/low clutch (6) rearward. The high/low clutch (6) outer teeth disengage from the input shaft (2) high-speed teeth. The high/low clutch (6) outer teeth then engage in the high/low planetary carrier teeth (5). The power flow is now from the transmission (1), to the planetary teeth on the input shaft (2), to the planetary gears (3) in the high/low planetary carrier assembly (5). Rotating the planetary gears (3), which are engaged in the high/low internal gear (4), rotates the high/low planetary carrier assembly (5). The high/low planetary carrier assembly (5) delivers the power to the high/low clutch (6). The high/low clutch (6) then drives the rear output shaft (7), providing a 2.68:1 gear ratio reduction to the rear output shaft (7). The sleeve is still engaged to drive the drive sprocket (9), as in the 4HI position, providing the engine power to the rear propeller shaft (10) and to the front propeller shaft (11).

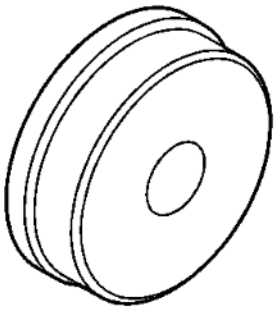
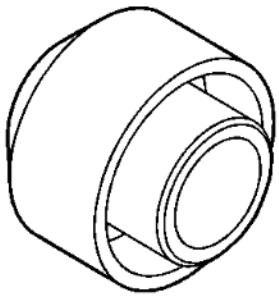
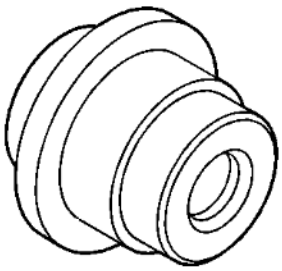
NEUTRAL Mode Power Flow

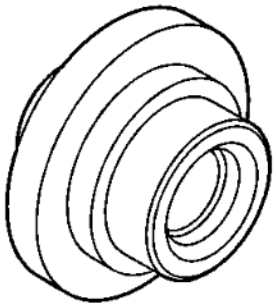
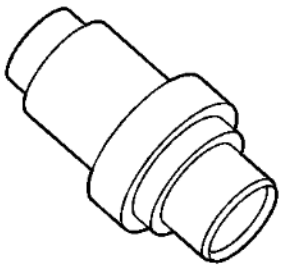
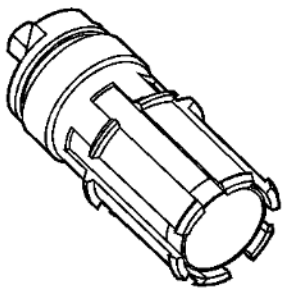
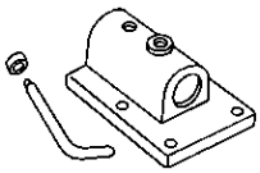
Shifting to the NEUTRAL position, the high/low clutch is centered between the input shaft and the high/low planetary carrier. The high/low clutch is not engaged with either the input shaft or the high/low planetary carrier teeth. The 2/4 wheel drive synchronizer is in the 4HI mode position.

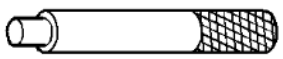
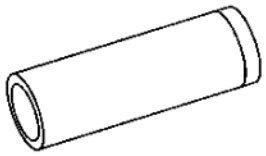
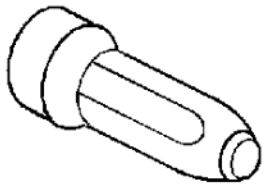
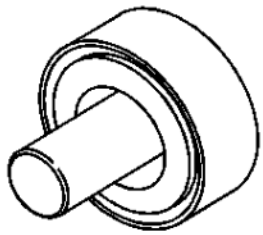
SPECIAL TOOLS AND EQUIPMENT

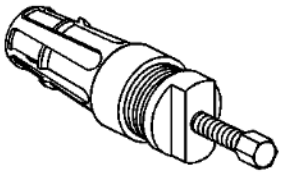
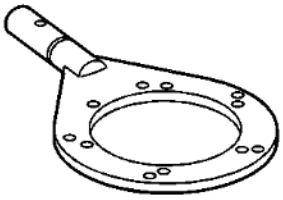
SPECIAL TOOLS

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-48215 Shift Detent Lever Bearing Installer
	DT-48734 Extension Housing Bushing Replacer
	J 3289-20 Holding Fixture

	J 7079-2 Universal Driver Handle - Non-Threaded
	J 8092 Driver Handle
	J 35512 Inner Pinion Bearing Installer
	J 42738 Seal Installer
	J 43484 Front Output Shaft Seal Installer

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