# SPECIFICATIONS

## FASTENER SPECIFICATIONS

**Single Use Non-Threaded Fasteners/Components**

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

**Reusable Threaded Fastener Tightening Specifications**

| NOTE: *All fasteners listed in this table can be reused after removal.* | |
|---|---|
| **Application** | **Specification** |
| | **Metric (English)** |
| Transfer Case@ Adapter Nut | 50 N.m (37 lb ft) |
| Transfer Case Adapter Bolt@Transmission | 50 N.m (37 lb ft) |
| Transfer Case Adapter Bolt | 25 N.m (18 lb ft) |
| Transfer Case Vibration Dampener Bolt - Model Dependent | 22 N.m (16 lb ft) |
| Transfer Case Vibration Dampener @Rear Case Stud - Model Dependent | 22 N.m (16 lb ft) |
| Transfer Case Control Lever Bezel Screw | 2.5 N.m (22 lb in) |
| Transfer Case Control Lever Bolt | 11 N.m (97 lb in) |
| Transfer Case Drain Plug | 18 N.m (13 lb ft) |
| Transfer Case 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 (Thread-in-Sensor) - Model Dependent | 17 N.m (13 lb ft) |
| Vehicle Speed Sensor Bolt (Sensor Retained by Bolt) - Model Dependent | 10 N.m (89 lb in) |

## APPROXIMATE FLUID CAPACITIES

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| Application | Specification | |
|---|---|---|
| | Metric | English |
| Transfer Case- MP 1222/1225/1226-NQG | | |
| DEXRONÂ®VI | 1.5 liters | 1.6 quarts |

## ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

| Application | Type of Material | GM Part Number | |
|---|---|---|---|
| | | United States | Canada |
| Transfer Case | DEXRON VI | 88861037 | 19264717 |
| Transfer Case Control Lever Bolt/Screw | Threadlocker | 19332211 | 10953489 |
| Transfer Case Oil Drain Plug | Sealant | 12346004 | 10953480 |
| Transfer Case Oil Fill Plug | Sealant | 12346004 | 10953480 |
| Transfer Case Rear Case Half to Transfer Case Front Half Assembly | Sealant | 88861417<br>12378521 | 88861418 |
| Transfer Case Selector Switch - O-Ring - Seal | DEXRON VI | 88861037 | 19264717 |
| Transfer Case Shift Detent Plunger Plug Seal | DEXRON VI | 88861037 | 19264717 |
| Transfer Case Vent | Sealant | 12377901 | 10953504 |
| Vehicle Speed Sensor - O-Ring - Seal | DEXRON VI | 88861037 | 19264717 |

# SCHEMATIC AND ROUTING DIAGRAMS

## TRANSFER CASE CONTROL SCHEMATICS

### Transfer Case Controls

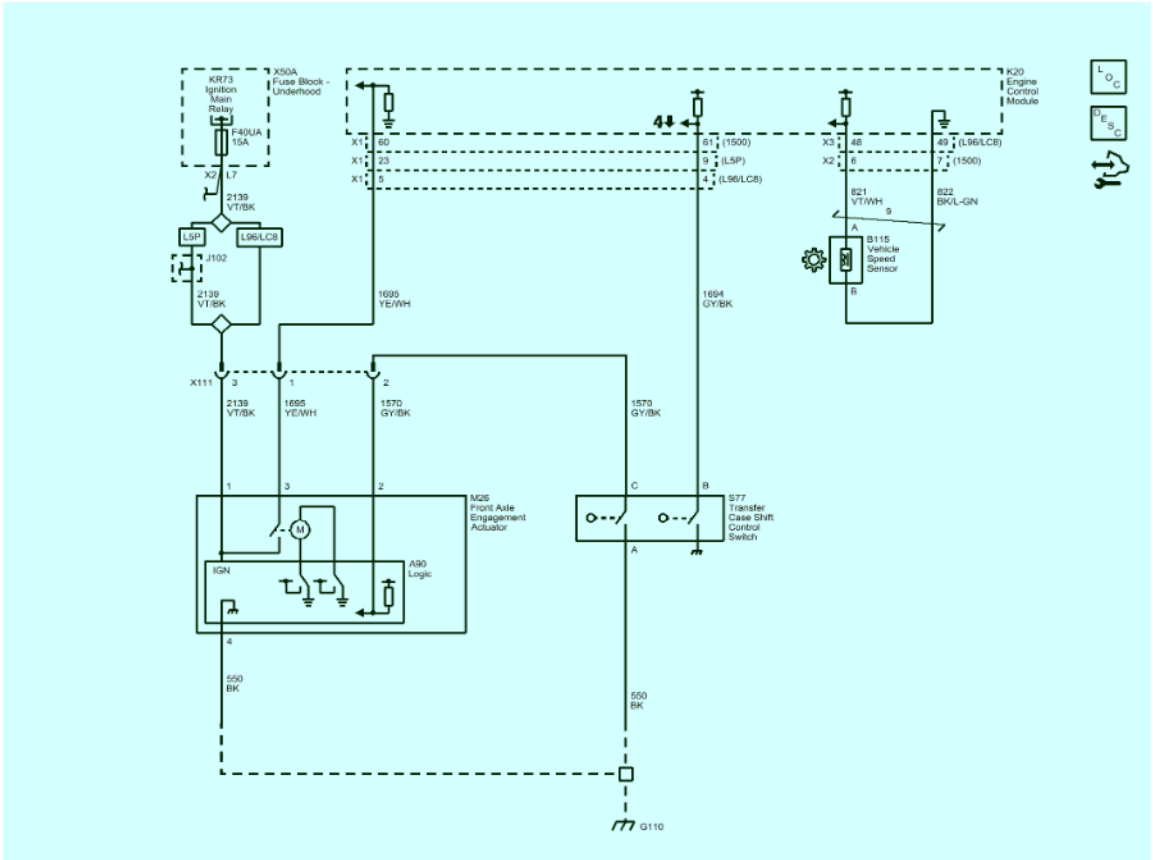



Fig. 1: Transfer Case Controls

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# COMPONENT LOCATOR

## TRANSFER CASE DISASSEMBLED VIEW

### Case Half Components

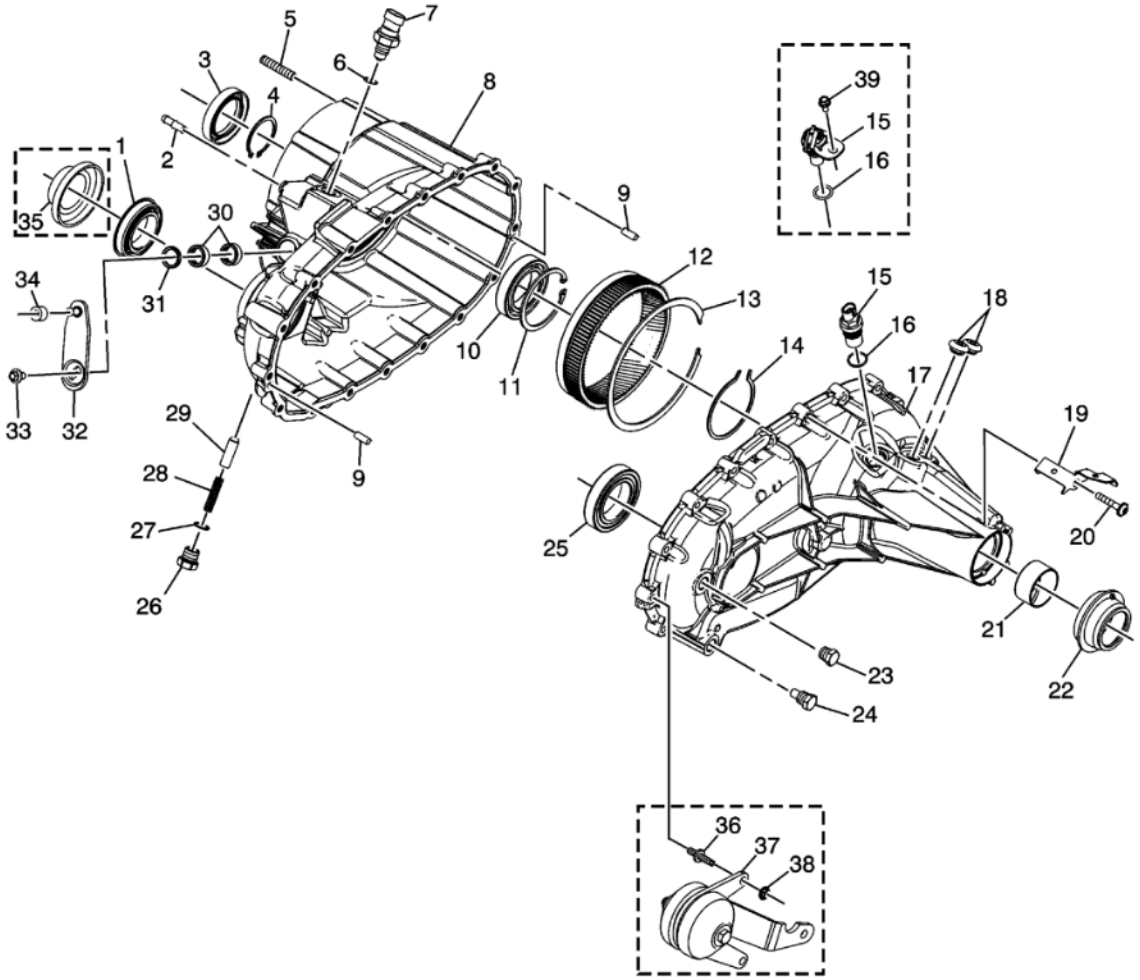



**Fig. 2: Case Half Components**
Courtesy of GENERAL MOTORS COMPANY

| 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 |

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| Callout | Component Name |
|---|---|
| 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 - Model Dependent |
| 16 | Vehicle Speed Sensor - O-Ring - Seal - Model Dependent |
| 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 |
| 35 | Transfer Case Front Output Shaft Oil Slinger- Model Dependent |
| 36 | Transfer Case Vibration Dampener Stud - Model Dependent |
| 37 | Transfer Case Vibration Dampener - Model Dependent |
| 38 | Transfer Case Vibration Dampener Nut - Model Dependent |
| 39 | Vehicle Speed Sensor Assembly Bolt - Model Dependent |

**Internal Components (Light Duty)**

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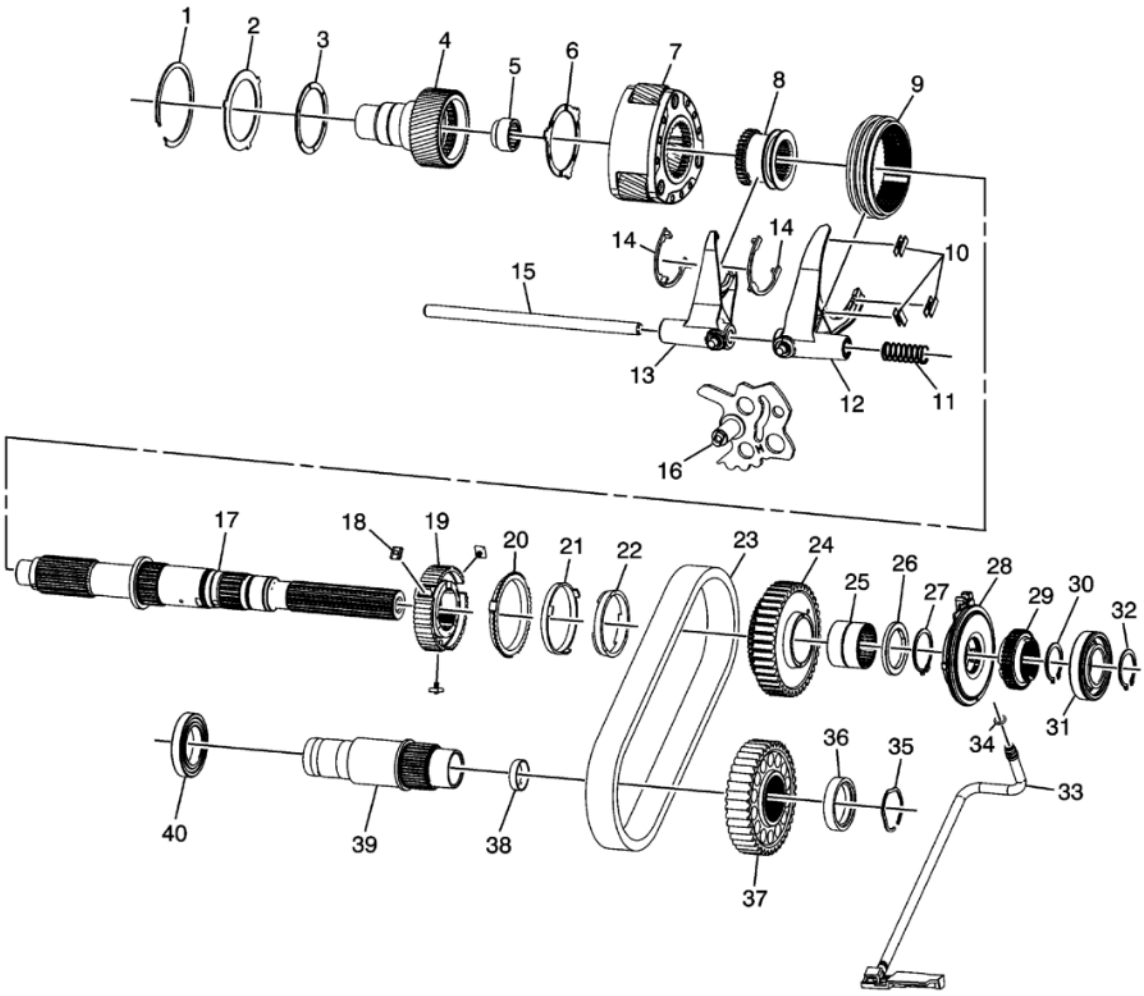



**Fig. 3: Internal Components (Light Duty)**
**Courtesy of GENERAL MOTORS COMPANY**

| 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 Planetary Carrier Sun Gear Thrust Washer |
| 7 | Transfer Case High/Low Planetary Carrier Assembly |
| 8 | Transfer Case High/Low Clutch |
| 9 | Transfer Case Two/Four Wheel Drive Synchronizer Sleeve |
| 10 | Transfer Case Two/Four Wheel Drive Shift Fork Inserts |
| 11 | Transfer Case Shift Fork Spring |
| 12 | Transfer Case Two/Four Wheel Drive Shift Fork Assembly |
| 13 | Transfer Case High/Low Shift Fork |
| 14 | Transfer Case High/Low Shift Fork Pads |
| 15 | Transfer Case Control Actuator Shaft |
| 16 | Transfer Case Shift Detent Lever Assembly |
| 17 | Transfer Case Rear Output Shaft |

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| Callout | Component Name |
|---|---|
| 18 | Transfer Case Two/Four Wheel Drive Synchronizer Inserts |
| 19 | Transfer Case Two/Four Wheel Drive Synchronizer Hub |
| 20 | Transfer Case Two/Four Wheel Drive Synchronizer Assembly |
| 21 | Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring- Outer |
| 22 | Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring- Inner |
| 23 | Transfer Case Front Output Shaft Drive Chain Assembly |
| 24 | Transfer Case Front Output Shaft Drive Sprocket |
| 25 | Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly |
| 26 | Transfer Case Front Output Shaft Drive Sprocket Spacer- Rear |
| 27 | Transfer Case Front Output Shaft Drive Sprocket Retaining Ring |
| 28 | Transfer Case Oil Pump Assembly |
| 29 | Transfer Case Rear Output Shaft Speed Reluctor Wheel |
| 30 | Transfer Case Rear Output Shaft Rear Bearing Retaining Ring |
| 31 | Transfer Case Rear Output Shaft Rear Bearing Assembly |
| 32 | Transfer Case Rear Output Shaft Rear Bearing Retaining Ring |
| 33 | Transfer Case Oil Pump Suction Pipe |
| 34 | Transfer Case Oil Pump Suction Pipe Seal |
| 35 | Transfer Case Front Output Shaft Driven Sprocket Spacer Spring |
| 36 | Transfer Case Front Output Shaft Driven Sprocket Spacer |
| 37 | Transfer Case Front Output Shaft Driven Sprocket |
| 38 | Transfer Case Front Output Shaft Hole Plug |
| 39 | Transfer Case Front Output Shaft |
| 40 | Transfer Case Front Output Shaft Front Bearing Assembly |

**Internal Components (Heavy Duty)**

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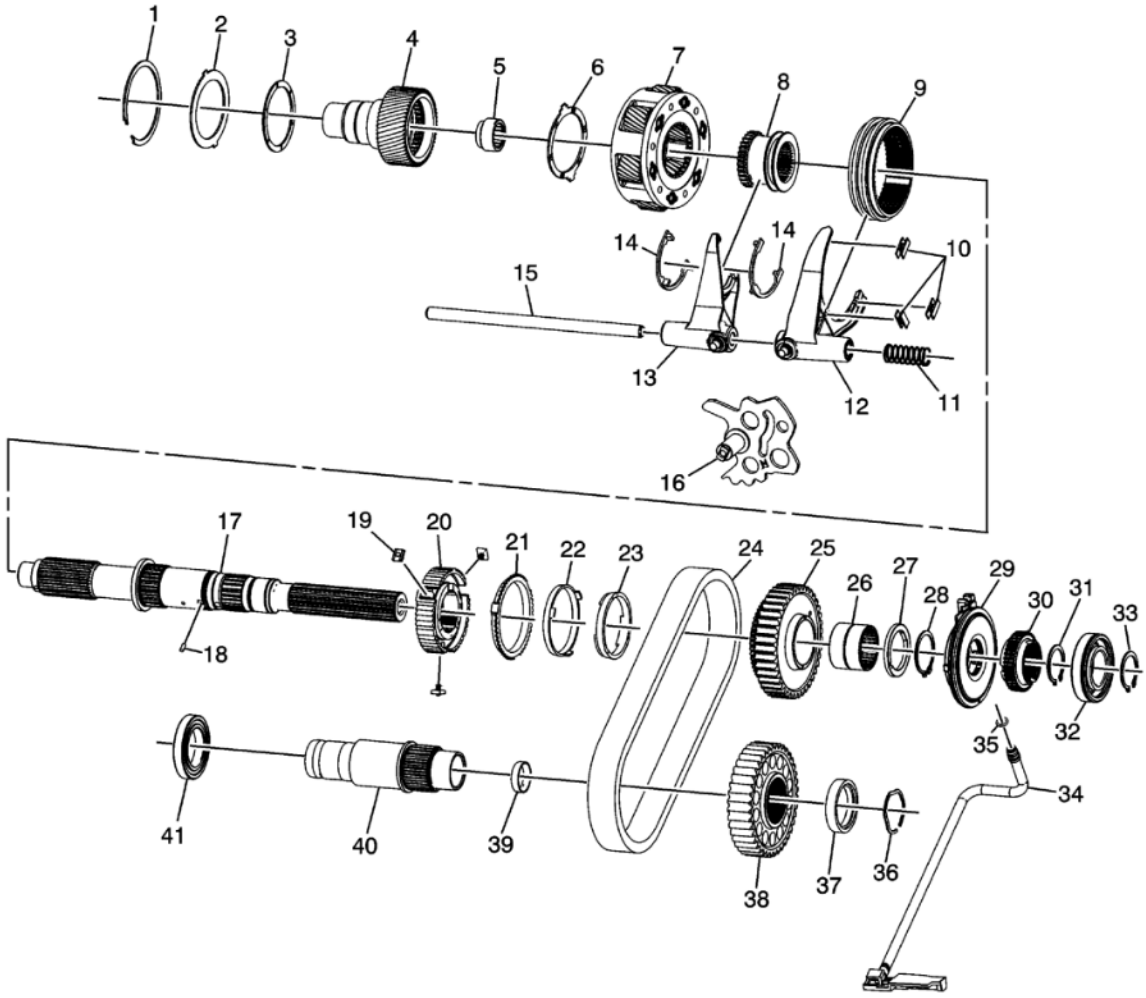



**Fig. 4: Internal Components (Heavy Duty)**
**Courtesy of GENERAL MOTORS COMPANY**

| 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 Planetary Carrier Sun Gear Thrust Washer |
| 7 | Transfer Case High/Low Planetary Carrier Assembly |
| 8 | Transfer Case High/Low Clutch |
| 9 | Transfer Case Two/Four Wheel Drive Synchronizer Sleeve |
| 10 | Transfer Case Two/Four Wheel Drive Shift Fork Inserts |
| 11 | Transfer Case Shift Fork Spring |
| 12 | Transfer Case Two/Four Wheel Drive Shift Fork Assembly |
| 13 | Transfer Case High/Low Shift Fork |
| 14 | Transfer Case High/Low Shift Fork Pads |
| 15 | Transfer Case Control Actuator Shaft |
| 16 | Transfer Case Shift Detent Lever Assembly |
| 17 | Transfer Case Rear Output Shaft |

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| Callout | Component Name |
|---|---|
| 18 | Transfer Case Front Output Shaft Drive Sprocket Spacer Pin |
| 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 |
| 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

## DTC P2160 OR P2161: VEHICLE SPEED SENSOR (2-WIRE)

### Diagnostic Instructions

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

### DTC Descriptor

#### DTC P2160

Vehicle Speed Sensor 2 Circuit Low Voltage

#### DTC P2161

Vehicle Speed Sensor 2 Circuit Intermittent

### Diagnostic Fault Information

| Circuit | Short to | Open/High | Short to | Signal |
|---|---|---|---|---|

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| | Ground | Resistance | Voltage | Performance |
|---|---|---|---|---|
| Signal circuit | P2160, P2161 | P2160, P2161 | P2160, P2161 | P2160, P2161 |
| Low Reference circuit | P2160, P2161 | P2160, P2161 | P2160, P2161 | P2160, P2161 |

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**

- DTC P0716, P0717, P0722, P0723, P1810, P1815, P1816, P1818 = Not set
- Transmission Not in Park or Neutral
- Transmission Fluid Temperature -40 to 150Â°C (-40 to 302Â°F)
- Throttle Position Greater than 8%
- Engine Torque Greater than 50 N.m (37 lb ft)
- Transmission Input Speed =Greater than 1500 RPM
- TCC Slip Speed =Greater than -20 RPM

**P2161**

- DTC P0716, P0717, P0974 = Not set
- Transmission Not in Park or Neutral
- Transmission Output Speed =Greater than 1400 RPM - For greater than 2 s
- 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**

Transfer Case OSS =Less than 50 RPM - For greater than 4.5 s

**P2161**

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

### Actions Taken When the DTC Sets

- DTCs P2160 and P2161 are Type B DTCs.
- The TCM commands maximum line pressure.
- Transmission Adaptive Pressure Control=Disabled
- The TCM calculates vehicle speed from the automatic transmission input shaft speed sensor and commanded gear.

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#### 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.
- The Actions Taken for DTC P2160 or P6161 may set DTC P16F3.

#### Reference Information

Schematic Reference

- **Transfer Case Control Schematics**
- **Engine Controls Schematics** for 4.3L
- **Engine Controls Schematics** for 5.3Lor 6.2L
- **Engine Controls Schematics** for 6.0L
- **Engine Controls Schematics** for 6.6L

Connector End View Reference

**COMPONENT CONNECTOR END VIEWS - INDEX**

Description and Operation

**Transfer Case Description and Operation**

Electrical Information Reference

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

DTC Type Reference

**Powertrain Diagnostic Trouble Code (DTC) Type Definitions**

Scan Tool Reference

**Control Module References** for scan tool information

#### Circuit/System Verification

1. Raise and support the vehicle.
2. Engine=Idle
3. Transmission in Drive
4. Verify the scan tool parameter:Transfer Case OSS =Greater than 100 RPM

#### Circuit/System Testing

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1. Ignition Off
2. Disconnect the electrical connector:Transfer Case OSS
3. Ignition - On / Vehicle - In Service Mode
4. Test for 2.0 to 3.0 V between the test points:Signal circuit terminal A @ Harness Connector & chassis Ground
    - **If less than 2 V**
    1. Ignition/Vehicle - Off
    2. Disconnect the electrical connector:
        - { LV1, LV3, } X2 @ K20 Engine Control Module
        - { L96, LC8 } X3 @ K20 Engine Control Module
    3. Test for infinite resistance between the test points:Signal circuit terminal A @Harness Connector & Chassis Ground
        - If less than infinite resistance - Repair the short to ground on the circuit.
        - If infinite resistance
    4. Test for less than 2 ohms between the test points:Signal circuit terminal A @Component harness &
        - { LV1, LV3, }X2-Terminal 6@Control module harness
        - { L96, LC8 }X3-Terminal 48@Control module harness
        - If 2 ohms or greater - Repair the open/high resistance in the circuit.
        - If less than 2 ohms - Replace the component:K20 Engine Control Module
    - **If greater than 3 V**
    1. Ignition/Vehicle - Off
    2. Disconnect the electrical connector:
        - { LV1, LV3, }X2@K20 Engine Control Module
        - { L96, LC8 }X3@K20 Engine Control Module
    3. Ignition - On / Vehicle - In Service Mode
    4. Test for less than 1 V between the test points:Signal circuit terminal A @Harness Connector & Chassis Ground
        - If 1 V or greater - Repair the short to voltage on the circuit.
        - If less than 1 V - Replace the component:K20 Engine Control Module
    - **If between 2 and 3 V**
5. Test for 2 to 3 V between the test points:Low Reference circuit terminal B @ Harness Connector & Chassis Ground
    - **If less than 2 V**
    1. Ignition/Vehicle - Off
    2. Disconnect the electrical connector:
        - { LV1, LV3, }X2@K20 Engine Control Module
        - { L96, LC8 }X3@K20 Engine Control Module
    3. Test for infinite resistance between the test points:Low Reference circuit terminal B @Harness Connector & Chassis Ground
        - If less than infinite resistance - Repair the short to ground on the circuit.
        - If infinite resistance
    4. Test for less than 2 ohms between the test points:Low Reference circuit terminal B @Component harness &
        - { LV1, LV3, }X2-Terminal 7@Control module harness

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- { L96, LC8 }X3-Terminal 49@Control module harness
- If 2 ohms or greater - Repair the open/high resistance in the circuit.
- If less than 2 ohms - Replace the component:K20 Engine Control Module

- **If greater than 3 V**

1. Ignition/Vehicle - Off
2. Disconnect the electrical connector:
   - { LV1, LV3, }X2@K20 Engine Control Module
   - { L96, LC8 }X3@K20 Engine Control Module
3. Ignition - On / Vehicle - In Service Mode
4. Test for less than 1 V between the test points:Low Reference circuit terminal B @Harness Connector & Chassis Ground
   - If 1 V or greater - Repair the short to voltage on the circuit.
   - If less than 1 V - Replace the component:K20 Engine Control Module

- **If between 2 and 3 V**

6. Test or replace the component:Transfer Case OSS

**Component Testing**

1. Ignition Off
2. Disconnect the component Transfer Case OSS
3. Test for 1200 to 2400 ohms between the test points:
   - Signal circuit terminal A
   - Signal circuit terminal B
     - If not between 1200 and 2400 ohms Replace the component:Transfer Case OSS
     - If between 1200 and 2400 ohms
4. Test for greater than 10 M ohms between the test points:
   - Signal circuit terminal A
   - Chassis Ground
     - If less than 10 M ohms Replace the component:Transfer Case OSS
     - If greater than 10 M ohms

**NOTE:** **The passenger side rear wheel takes more effort to turn than the drivers side wheel. If both drive wheels are raised and unblocked, twice the effort will be required to reach 0.4 V AC. If the vehicle is sufficiently supported to safely place the transmission in neutral, less effort will be required to turn the raised wheel.**

5. Block the front wheels. Raise and support the driver's side rear wheel.
6. While rotating the raised wheel by hand, test for greater than 0.4 V AC between the VSS high signal circuit, VSS pin A, and the VSS low signal circuit, VSS harness pin B.
   - If 0.4 V AC or lessReplace the component:Transfer Case OSS
   - If greater than 0.4 V AC
7. All OK.

**Repair Instructions**

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

- **Vehicle Speed Sensor Replacement (Non Digital)Vehicle Speed Sensor Replacement (Digital)**
- For control module replacement, programming, and setup refer to: **Control Module References**

## 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 Banging 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 Difficult to Shift - Cold Ambient Temperature**
- **Transfer Case Jumps Out of Gear**
- **Transfer Case Leak Diagnosis**

## FOUR-WHEEL DRIVE DOES NOT DISENGAGE

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### 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 - INDEX**

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 monitor the front axle engagement feedback switch parameter.
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.

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- 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 Instructions

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

- **Front Drive Axle Actuator Replacement (1500 Series)** **Front Drive Axle Actuator Replacement (2500/3500 Series)**
- **Transfer Case Control Lever Replacement**
- **Transfer Case Control Rod 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:

- 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

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Schematic Reference

**Transfer Case Control Schematics**

Connector End View Reference

**COMPONENT CONNECTOR END VIEWS - INDEX**

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 monitor the front axle engagement feedback switch parameter.
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 Instructions

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

- **Front Drive Axle Actuator Replacement (1500 Series)** **Front Drive Axle Actuator Replacement (2500/3500 Series)**
- **Transfer Case Control Lever Replacement**
- **Transfer Case Control Rod 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.

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- 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 - INDEX**

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.

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### Repair Instructions

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

- **Instrument Cluster Replacement**
- **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 - INDEX**

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

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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 Instructions

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

- **Instrument Cluster Replacement**
- **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 light popping noise in the transfer case. A light popping type noise that occurs when shifting, and quits after the shift is completed would be considered normal. When shifting out of 4HI in a mode shift, there may be a delay and a popping may be heard when the HI/LO clutch disengages.<br><br>1. COMPARE THE NOISE TO A SIMILAR VEHICLE TO SEE IF A NORMAL CONDITION.<br>2. IDENTIFY THE SOURCE OF THE NOISE USING CHASSIS EARS AND REFER TO THE APPROPRIATE SERVICE MANUAL SECTION.<br>3. Note specifics such as when the noise is present (2HI, 4HI, or 4LO).<br>4. Note if the noise relative to vehicle speed, is noisy on turns, or other specifics.<br>5. If the source of the noise is the transfer case, inspect for the correct fluid level.<br>6. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br><br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Transmission or transfer case mounts loose or damaged | Repair or replace the mounts as required |
| Propeller shaft center support bearing loose or damaged (as applicable) | Replace the center support bearing as required. Refer to **Symptoms - Propeller Shaft** . |
| Propeller shaft universal joints worn | Replace the universal joints as required. Refer to **Symptoms - Propeller Shaft** . |

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| Cause | Correction |
| --- | --- |
| Suspension components worn | Replace the suspension components as required. Refer to **Noise Diagnosis - Front Suspension** , or **Noise Diagnosis - Rear Suspension** . |
| Front axle actuator shift noise | **NOTE:**<br>**When shifting from 2WD-to-4WD or 4WD-to-2WD, the front axle actuator may be heard engaging or disengaging and the axle internal components shifting. This is to be considered a normal condition.**<br><br>Shift from 2WD-to-4WD and from 4WD-to-2WD to determine if the noise source is the front axle to determine if this is a normal condition. |
| Transfer case drive and driven sprockets worn or a stretched chain causing a chain jump condition | **NOTE:**<br>• **A chain jump condition may cause a banging noise and can only occur with the vehicle in 4WD.**<br>• **A chain jump condition may be caused by water intrusion into the transfer case and deterioration of the transfer case fluid. Water** |

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| Cause | Correction |
| --- | --- |
| | **intrusion conditions may occur in extreme off road conditions or in situations where under-vehicle power washing occurs.**<br><br>1. Inspect the oil for water intrusion and/or fluid discoloration and contamination.<br>2. Inspect the vent hose for proper routing and connection to the transfer case.<br>3. Inspect for damaged internal components. Refer to **Drive Chain, Drive Sprocket, and Driven Sprocket Cleaning and Inspection**<br>4. Replace the chain and sprockets as required. Refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**. |

## TRANSFER CASE BANGING NOISE

| Cause | Correction |
| --- | --- |
| A faulty internal transfer case component that causes a loud banging noise in the transfer case.<br><br>1. Compare the noise to a similar vehicle to see if a normal condition.<br>2. Identify the source of the noise using chassis ears and refer to the appropriate service manual section.<br>3. Note specifics such as when the noise is present (2HI, 4HI, or 4LO).<br>4. Note if the noise is relative to vehicle speed, is noisy on turns, or other specifics.<br>5. If the source of the noise is the transfer case, inspect for the correct fluid level.<br>6. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br><br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Transmission or transfer case mounts loose or damaged | Repair or replace the mounts as required |
| Propeller shaft center support bearing loose or damaged (as applicable) | Replace the center support bearing as required. Refer to **Symptoms - Propeller Shaft** . |
| Propeller shaft universal joints worn | Replace the universal joints as required. Refer to **Symptoms - Propeller Shaft** . |

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| Cause | Correction |
| --- | --- |
| Suspension components worn | Replace the Suspension components as required. Refer to **Noise Diagnosis - Front Suspension** , or **Noise Diagnosis - Rear Suspension** . |
| Transfer case rear output shaft bushing worn | **NOTE:**<br>**A worn bushing and or slip yoke may also create a clunk type noise and may be indicated by a leaking rear output shaft seal.**<br><br>Replace the rear output shaft bushing and propeller shaft slip yoke as required. |
| Transfer case shift fork pads broken | Replace the shift fork and pads as required. Refer to **High/Low Shift Components Cleaning and Inspection**, and **Two/Four Wheel Drive Shift Components Cleaning and Inspection**. |
| Transfer case drive and driven sprockets worn or a stretched chain causing a chain jump condition | **NOTE:**<br>• **A chain jump condition may cause a banging noise and can only occur with the vehicle in 4WD.**<br>• **A chain jump condition may be caused by water intrusion into the transfer case and deterioration of the transfer case fluid. Water intrusion conditions may occur** |

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| Cause | Correction |
|---|---|
| | **in extreme off road conditions or in situations where under-vehicle power washing occurs.**<br><br>1. Inspect the oil for water intrusion and/or fluid discoloration and contamination.<br>2. Inspect the vent hose for proper routing and connection to the transfer case.<br>3. Inspect for damaged internal components. Refer to **Drive Chain, Drive Sprocket, and Driven Sprocket Cleaning and Inspection**.<br>4. Replace the chain and sprockets as required. Refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**. |

## TRANSFER CASE WHINE OR RUMBLE NOISE

| Cause | Correction |
|---|---|
| DEFINITION: a faulty internal transfer case component that causes a high pitch whine or low pitch rumbling noise in the transfer case. A high pitch whine or rumble noise with the vehicle in 4LO is to be considered normal. Super heavy duty NQG transfer case applications are noisier by design in 4WD mode than are the lighter duty applications. Manual shift transfer cases tend to transmit greater noise conditions into the vehicle cab than do electric shift applications.<br><br>1. Compare the noise to a similar vehicle to see if a normal condition.<br>2. Identify the source of the noise using chassis ears and refer to the appropriate service manual section.<br>3. Note specifics such as when the noise is present (2HI, 4HI, OR 4LO).<br>4. Note if the noise relative to vehicle speed, is noisy on turns, or other specifics.<br>5. If the source of the noise is the transfer case, inspect for the correct fluid level.<br>6. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br><br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Tire noise | **NOTE:**<br>**A high pitch whine or low pitch rumble noise that increases as vehicle** |

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| Cause | Correction |
| --- | --- |
| | **speed increases may be caused by tires that are, unevenly inflated, unevenly worn or have an aggressive tread pattern.**<br><br>Rotate or substitute tires and retest. Refer to **Tire and Wheel Inspection** . |
| Propeller shaft center support bearing worn (as applicable) | **NOTE:**<br>**A high pitch whine or low pitch rumble noise that increases as vehicle speed increases may be caused by a worn center support bearing.**<br><br>Replace the center support bearing as required. Refer to **Symptoms - Propeller Shaft** . |
| Propeller shaft universal joints worn | **NOTE:**<br>**A high pitch whine or low pitch rumble noise that increases as vehicle speed increases may be caused by worn universal joints.**<br><br>Replace the universal joints as required. Refer to **Symptoms - Propeller Shaft** . |

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| Cause | Correction |
| --- | --- |
| Front or rear axle bearings worn | **NOTE:**<br>• **A high pitch whine or low pitch rumble noise that increases as vehicle speed increase may be caused by worn axle bearings.**<br>• **To determine if the noise is front axle related, remove the front propeller shaft and retest.**<br><br>Repair or replace the axle as required. Refer to **Symptoms - Front Drive Axle** , or **Symptoms - Rear Drive Axle** . |
| Transmission rear output shaft bearing worn | **NOTE:**<br>**A high pitch whine or low pitch rumble noise that increases as transmission output shaft speed increases may be caused by a worn transmission output shaft bearing.**<br><br>Repair or replace the transmission as required. Refer to **Symptoms -** |

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| Cause | Correction |
| --- | --- |
| | Automatic Transmission . |
| Transfer case fluid level low | **NOTE:**<br>**A high pitch whine or low pitch rumble noise that increases as transmission output shaft speed increases may be caused by a low transfer case fluid level.**<br><br>Fill the transfer case to the correct fluid level and retest. |
| Transfer case input shaft bearing worn | **NOTE:**<br>**A high pitch whine or low pitch rumble noise that increases as transmission output shaft speed increases may be caused by a worn transfer case input shaft bearing.**<br><br>Replace the bearing as required. Refer to Transfer Case Disassemble, and Transfer Case Assemble. |
| Transfer case rear output shaft bushing worn | **NOTE:**<br>• **An excessively worn bushing may be indicated by a leaking rear output shaft seal.**<br>• **A high pitch whine** |

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| Cause | Correction |
| --- | --- |
| | **or low pitch rumble noise that increases as vehicle speed increases may be caused by a worn transfer case rear output shaft bushing.**<br><br>Replace the rear output shaft bushing and propeller shaft slip yoke as required. Refer to **Rear Output Shaft Bushing Replacement**. |
| Transfer case front or rear output shaft bearings worn | **NOTE:**<br>**A high pitch whine or low pitch rumble noise that increases with road speed may be caused by the front or rear output shaft bearing.**<br><br>Replace the bearings as required. Refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**. |
| Transfer case planetary carrier gears worn | **NOTE:**<br>• **A high pitch whine or low pitch rumble noise that increases in 2HI only may be caused by worn** |

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| Cause | Correction |
| --- | --- |
| | **or damaged planetary gears and ring gear damage.**<br>• **A whine noise that occurs in either 2HI or 4HI may be caused by worn planetary gear needle bearings or shafts.**<br>• **A high pitch whine that occurs in 4LO may be caused by worn planetary gears or annulus gear. Repair as required**<br><br>1. Inspect for the following:<br>• Chipped, bent, or deformed teeth<br>• Planetary gear needle bearings worn<br>• Planetary gear thrust washers cracked or missing<br>• Seized or binding planetary gears. Refer to **High/Low Planetary Carrier Cleaning and Inspection**<br>2. Replace the planetary components as required. |

## TRANSFER CASE GROWL OR GRINDING NOISE

| Cause | Correction |
| --- | --- |

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| Cause | Correction |
| --- | --- |
| DEFINITION: a faulty internal transfer case component that causes a low pitch growl or grinding noise in the transfer case while the vehicle is turning left or right or in a four wheel drive mode. A low pitch growl noise with the vehicle in 4LO or 4HI is to be considered normal. Super heavy duty transfer case applications are noisier by design in 4HI than are the light duty applications. Manual-shift transfer cases tend to transmit greater noise conditions into the vehicle cab than do electric shift applications.<br>The typical noise and vibration that is heard or felt is due to a combination of the transfer case chain link frequency, engine firing frequency, tire circumference variation, and various other tolerances in the 4 wheel drive system. The noise may seem to be increased, compared to vehicles with NQF/NQH/NP0 transfer cases due to the noise transfer path of the manual shift lever through the floor. The noise may also be more noticeable in vehicles equipped with vinyl flooring due to the vinyl flooring not having as much mass and noise dampening effect as carpet.<br>On certain models, such as 3/4 and 1 ton vehicles, tire pressures can vary from front to rear based on the manufacturer's specifications. As an example the manufacturer's specifications for tire pressures on a 2011 K2500 Silverado could be front: 65 PSI, rear: 80 PSI. The difference in tire pressures affects the rolling tire circumference from front to rear which can increase driveline noise while in 4WD which is an operating characteristic. For test purposes, drop the tire pressure in the rear to match the front. If the noise is reduced or eliminated this confirms the difference in tire pressures from front to rear can affect the noise when operated in 4WD. Set the rear tire pressure back to the manufacturer's specification. For vehicles with the same tire pressures front to rear, swap tires from an identically built vehicle that does not seem to exhibit the concern and re-evaluate both vehicles. Ensure that interior content is the same ensuring that both vehicles have carpet or vinyl flooring. Further diagnostics would include shifting the transfer case to 4WD high and then disconnecting the shift lever and re-evaluating the vehicle operation. If the noise is greatly reduced or eliminated then the shift lever is the transfer path for the noise and is an operating characteristic. No repairs are recommended for this condition.<br><br>**CAUTION:**<br>**Driving on clean, dry pavement in Four-Wheel Drive High or Four-Wheel Drive Low for an extended period of time may cause premature wear on your vehicles powertrain. Do not drive on clean, dry pavement in Four-Wheel Drive High or Four-Wheel Drive Low for extended** | |

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| Cause | Correction |
| --- | --- |
| **periods of time. While driving on clean dry pavement and during tight turns, you may experience vibration in the steering system.**<br><br>1. Compare the noise to a similar vehicle to see if a normal condition.<br>2. Identify the source of the noise using chassis ears and refer to the appropriate service manual section.<br>3. Note specifics such as when the noise is present (2HI, 4HI, OR 4LO).<br><br>A growl noise that occurs in 4HI only, on dry pavement at throttle tip-in may be considered a normal condition.<br><br>1. Shift the transfer case to 4HI.<br>2. Disconnect the shift control rod from the transfer case and shift control lever.<br>3. Retest the vehicle to see if the condition has been eliminated or reduced. If the growl noise has been eliminated or reduced, the condition may be considered a normal operating characteristic of the 4WD system. If the growl noise remains, further diagnosis of the transfer case using chassis ears may be required to isolate the location of the noise.<br>4. Note if the noise relative to vehicle speed, is noisy on turns, or other specifics.<br>5. If the source of the noise is the transfer case, inspect for the correct fluid level.<br>6. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br><br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Tire Wear | **NOTE:**<br>**A growl noise that increases as vehicle speed increases may be caused by tires that are unevenly worn, unevenly inflated, or have an aggressive tread** |

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| Cause | Correction |
| --- | --- |
| | **pattern.**<br><br>Rotate or substitute tires and retest. Refer to **Tire and Wheel Inspection** . |
| Propeller shaft center support bearing worn (as applicable) | **NOTE:**<br>**A growl or grinding noise that increases as vehicle speed increase may be caused by a worn center support bearing.**<br><br>Replace the center support bearing as required. Refer to **Symptoms - Propeller Shaft** . |
| Propeller shaft universal joints worn | **NOTE:**<br>**A growl or grinding noise that increases as vehicle speed increases may be caused by worn universal joints.**<br><br>Replace the universal joints as required. Refer to **Symptoms - Propeller Shaft** |
| Front or rear axle bearings worn | **NOTE:**<br>• **A growl or grinding noise that increases as vehicle speed increase may be caused by worn axle bearings.** |

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

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| Cause | Correction |
| --- | --- |
| Transfer case input shaft bearing worn | **NOTE:**<br>**A high pitch whine or low pitch rumble noise that increases as transmission output shaft speed increases may be caused by a worn transfer case input shaft bearing.**<br><br>Replace the bearing as required. Refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**. |
| Transfer case rear output shaft bushing worn | **NOTE:**<br>• **An excessively worn bushing may be indicated by a leaking rear output shaft seal.**<br>• **A growl or grinding noise that increases as vehicle speed increases may be caused by a worn transfer case rear output shaft bushing.**<br><br>Replace the rear output shaft bushing and propeller shaft slip yoke as required. Refer to **Rear Output Shaft Bushing Replacement**. |

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

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| Cause | Correction |
| --- | --- |
| | **gear damage.**<br>• **A whine noise that occurs in either 2HI or 4HI may be caused by worn planetary gear needle bearings or shafts.**<br>• **A high pitch whine that occurs in 4LO may be caused by worn planetary gears or annulus gear. Repair as required**<br><br>1. Inspect for the following:<br>• Chipped, bent, or deformed teeth<br>• Planetary gear needle bearings worn<br>• Planetary gear thrust washers cracked or missing<br>• Seized or binding planetary gears. Refer to **High/Low Planetary Carrier Cleaning and Inspection**.<br>2. Replace the planetary components as required. |

## TRANSFER CASE CLUNK IN 2HI ONLY

| Cause | Correction |
| --- | --- |
| Definition: a faulty internal transfer case component that causes a clunk that is heard or felt during acceleration or deceleration with the transfer case in 2HI mode only. | 1. Compare the noise to a similar vehicle to see if a normal condition.<br>2. Identify the source of the noise using chassis ears and refer to the appropriate service manual section. |

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| Cause | Correction |
| --- | --- |
| 3. Note specifics such as when the noise is present (2HI, 4HI, OR 4LO).<br>4. Note if the noise relative to vehicle speed, is noisy on turns, or other specifics.<br>5. If the source of the noise is the transfer case, inspect for the correct fluid level.<br>6. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br><br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Transmission or transfer case mounts loose or damaged | Repair or replace the mounts as required. |
| Rear propeller shaft center support bearing loose or damaged (as applicable) | Replace the center support bearing as required. Refer to **Symptoms - Propeller Shaft** . |
| Rear propeller shaft universal joints worn | Replace the universal joints as required. Refer to **Symptoms - Propeller Shaft** . |
| Transfer case rear output shaft bushing worn | **NOTE:**<br>**An excessively worn bushing may be indicated by a leaking rear output shaft seal.**<br><br>Replace the rear output shaft bushing and propeller shaft sip yoke as required. |
| Suspension components worn | Replace the suspension components as required. Refer to **Noise Diagnosis - Front Suspension** , or **Noise Diagnosis - Rear Suspension** . |
| Front axle actuator shift noise | **NOTE:**<br>**When shifting from 2WD-to-4WD or 4WD-to-2WD, the front axle actuator may be heard engaging or disengaging and the axle internal components shifting. This is to be considered a normal condition.**<br><br>Shift from 2WD-to-4WD and from 4WD-to-2WD to determine if the noise |

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| Cause | Correction |
| --- | --- |
| | source is the front axle to determine if this is a normal condition. |
| Rear output shaft spline-to-propeller shaft slip yoke spline-excessive clearance | **NOTE:**<br>**A clunk condition in 2WD heard when the vehicle comes to a stop or from a stop-to-acceleration situation may be caused by excessive clearance between of the splines of the rear output shaft and propeller shaft slip yoke.**<br><br>Replace the following components<br>• Rear output shaft. Refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**.<br>• Propeller shaft slip yoke. Refer to **One-Piece Propeller Shaft Replacement** , and **Two-Piece Propeller Shaft Replacement (MYC, M5U, MSX)** **Two-Piece Propeller Shaft Replacement (MW7)** . |
| Transfer case rear output shaft rear bearing retaining ring incorrectly installed | 1. Inspect for the following:<br>• Improperly installed rear output shaft rear bearing retaining ring. The snap ring is to be installed completely into the OD groove of the bearing.<br>• Excessive wear or damaged retaining ring groove in the rear case half.<br>2. Repair or replace the following components AS REQUIRED:<br>• Properly install a new rear output shaft rear bearing outer retaining ring.<br>• 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**

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| Cause | Correction |
| --- | --- |
| DEFINITION: During acceleration or deceleration, a clunk is heard or felt in the transfer case while in the 4HI range only.<br><br>1. Compare the noise to a similar vehicle and see if a normal condition.<br>2. Identify the source of the noise using chassis ears and refer to the appropriate service manual section.<br>3. Note specifics such as when the noise is present (2HI, 4HI, OR 4LO).<br>4. Note if the noise relative to vehicle speed, is noisy on turns, during acceleration, stops, or other specifics.<br>5. If the source of the noise is the transfer case, inspect for the correct fluid level.<br>6. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br><br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Tire pressure uneven | **NOTE:**<br>**A clunk condition that occurs when performing slow speed turns in 4WD may be caused by low or uneven tire pressure.**<br><br>1. Set the tires to the recommended vehicle tire pressure for evaluation to see if the noise goes away.<br>2. Upon completion of the test, reset the tire pressure to the correct pressure as recommended on the tire. |
| Transmission or transfer case mounts loose or damaged | Repair or replace the mounts as required. |
| Propeller shaft center support bearing worn (as applicable) | Replace the center support bearing as required. Refer to **Symptoms - Propeller Shaft** . |
| Propeller shaft universal joints worn | Replace the universal joints as required. Refer to **Symptoms - Propeller Shaft** . |
| Front axle actuator shift noise | **NOTE:**<br>**When shifting from 2WD-to-4WD or 4WD-to-2WD, the front axle actuator may be heard engaging or** |

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| Cause | Correction |
| --- | --- |
| | **disengaging and the axle internal components shifting. This is to be considered a normal condition.**<br><br>Shift from 2WD-to-4WD and from 4WD-to-2WD to determine if the noise source is the front axle to determine if this is a normal condition. |
| Suspension components worn | Replace the suspension components as required. Refer to **Noise Diagnosis - Front Suspension** , or **Noise Diagnosis - Rear Suspension** . |
| 4WD gear noise | **NOTE:**<br>**A growl or clunk that occurs with vehicle in 4WD at low speed in a tight turning radius situation may be caused by the gears and chain and is to be considered a normal condition and an operating characteristic of a 4WD system.**<br><br>Operate the vehicle in 4WD performing low speed left or right turns to confirm a transfer case gear noise. |
| Transfer case planetary carrier gears worn | **NOTE:**<br>• **A clunk in 4HI noise that increases in 2HI only may be caused by worn** |

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| Cause | Correction |
| --- | --- |
| | **or damaged planetary gears and ring gear damage.**<br>• **A clunk in noise that occurs in either 2HI or 4HI may be caused by worn planetary gear needle bearings or shafts.**<br>• **A clunk that occurs in 4LO may be caused by worn planetary gears or annulus gear. Repair as required**<br><br>1. Inspect for the following:<br>• Chipped, bent, or deformed teeth<br>• Planetary gear needle bearings worn<br>• Planetary gear thrust washers cracked or missing<br>• Seized or binding planetary gears. Refer to **High/Low Planetary Carrier Cleaning and Inspection**<br>2. Replace the planetary components as required. |
| Transfer case rear output shaft rear bearing retaining ring-incorrectly installed | 1. Inspect for the following:<br>• Improperly installed rear output shaft rear bearing retaining ring. The snap ring is to be installed completely into the OD groove of the bearing<br>• Excessive wear or damaged retaining ring groove in the rear |

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| Cause | Correction |
|---|---|
| | case half<br>2. Repair or replace the following components AS REQUIRED:<br>• Properly install a new rear output shaft rear bearing outer retaining ring.<br>• 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 4LO

| Cause | Correction |
|---|---|
| DEFINITION: During acceleration or deceleration, a clunk is heard or felt in the transfer case while in the 4LO range only. It is typical for the vehicle to exhibit significant engagement noise and bump when shifting between Four-Wheel Drive Low and Four-Wheel Drive High ranges or from transfer case N (Neutral) with the engine running.<br><br>1. Review the correct owners manual shifting procedures with the customer.<br>2. Compare the noise to a similar vehicle and see if a normal condition.<br>3. Identify the source of the noise using chassis ears and refer to the appropriate service manual section.<br>4. Note specifics such as when the noise is present (2HI, 4HI, OR 4LO).<br>5. Note if the noise relative to vehicle speed, is noisy on turns, during acceleration, stops, or other specifics.<br>6. If the source of the noise is the transfer case, inspect for the correct fluid level.<br>7. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br><br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Tire pressure uneven | **NOTE:**<br>**A clunk condition that occurs when performing slow speed turns in 4WD may be caused by low or uneven tire pressure.**<br><br>1. Check the tire pressure and adjust as required to the value recommended by the label on the vehicle.<br>2. Road test the vehicle. |
| Transmission or transfer case mounts loose or damaged | Repair or replace the mounts as required |

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| Cause | Correction |
| --- | --- |
| Propeller shaft center support bearing worn (as applicable) | Replace the center support bearing as required. Refer to **Symptoms - Propeller Shaft** . |
| Propeller shaft universal joints worn | Replace the universal joints as required. Refer to **Symptoms - Propeller Shaft** . |
| Front axle actuator shift noise | **NOTE:**<br>**When shifting from 2WD-to-4WD or 4WD-to-2WD, the front axle actuator may be heard engaging or disengaging and the axle internal components shifting. This is to be considered a normal condition.**<br><br>Shift from 2WD-to-4WD and from 4WD-to-2WD to determine if the noise source is the front axle to determine if this is a normal condition. |
| Suspension components worn | Replace the suspension components as required. Refer to **Noise Diagnosis - Front Suspension** , or **Noise Diagnosis - Rear Suspension** . |
| Tire scuffing noise | **NOTE:**<br>**A growl or clunk that occurs with vehicle in 4WD at low speed in a tight turning radius situation may be caused by a tire scuffing type noise and is to be considered a normal condition and operating characteristic of a part-time** |

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| Cause | Correction |
| --- | --- |
| | **4WD system.**<br><br>Operate the vehicle in 4WD performing low speed left and right turns to confirm a tire scuffing type noise. |
| Transfer case planetary carrier gears worn | **NOTE:**<br>• **A clunk in 4HI noise that increases in 2HI only may be caused by worn or damaged planetary gears and ring gear damage.**<br>• **A clunk in noise that occurs in either 2HI or 4HI may be caused by worn planetary gear needle bearings or shafts.**<br>• **A clunk that occurs in 4LO may be caused by worn planetary gears or annulus gear. Repair as required** |

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| Cause | Correction |
|---|---|
| | 1. Inspect for the following:<br>• Chipped, bent, or deformed teeth<br>• Planetary gear needle bearings worn<br>• Planetary gear thrust washers cracked or missing<br>• Seized or binding planetary gears. Refer to **High/Low Planetary Carrier Cleaning and Inspection**.<br>2. Replace the planetary components as required. |

## TRANSFER CASE WILL NOT SHIFT

| Cause | Correction |
|---|---|
| DEFINITION: the transfer case will not shift from 2 wheel drive to 4 wheel drive or there is a gear clashing when shifting from HI to LO modes. When shifting from 2HI or 4HI to 4LO, the transmission must be in neutral and the vehicle speed below 3 mph.<br>1. Review the correct owners manual shifting procedures with the customer.<br>2. Inspect for the correct fluid level.<br>3. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Shift control rod and shift lever area dirt, debris, or ice restriction | Inspect for a dirt, debris, or ice restriction at the shift control rod and shift lever area |
| Transmission or transfer case mounts loose | Inspect the mounts, repair as required |
| Shift control lever assembly worn | Inspect the shift control lever for excessive wear or looseness |
| Shift control rod worn or incorrectly adjusted | 1. Inspect for a worn or incorrectly adjusted shift control rod.<br>2. Replace components as required. Refer to **Transfer Case Control Lever Replacement**, and **Transfer Case Control Rod Replacement**. |
| Transfer case shift lever loose | Inspect the shift lever located on the side of the transfer case for a loose fit to the shift shaft. Repair as required. |
| Front axle actuator | **NOTE:**<br>• **A transfer case that will not shift into 4WD may be caused by the front axle actuator.**<br>• **If the symptoms occur during cold temperatures,** |

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| Cause | Correction |
| --- | --- |
| | **flush and fill the front axle with synthetic fluid. Refer to Front Axle Lubricant Level Inspection (9.25 Inch Axle) Front Axle Lubricant Level Inspection (8.25 Inch Axle)**<br><br>1. Perform the **Diagnostic System Check - Vehicle** before using the symptom tables, in order to verify the following conditions are true:<br>• There are no diagnostic trouble codes (DTCs) present.<br>• The control modules can communicate via the serial data link.<br>2. Inspect for an intermittent. Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** , . Some symptoms may be caused by loose wiring. Test the system after moving or connecting harnesses, but before replacing parts. Refer to **Four-Wheel Drive Does Not Engage** . |
| Transfer case synchronizer components worn - range shift clash | **NOTE:**<br>**A range shift clash is defined as gear grinding type noise when shifting the transfer case. If the symptoms occur during cold temperatures, flush and fill the front axle with synthetic fluid. Refer to Front Axle Lubricant** |

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| Cause | Correction |
| --- | --- |
| | Level Inspection (9.25 Inch Axle) Front Axle Lubricant Level Inspection (8.25 Inch Axle) .<br><br>1. Inspect for the following:<br>• Worn synchronizer components<br>• Broken or damaged shift fork pads. Refer to Two/Four Wheel Drive Shift Components Cleaning and Inspection<br>• Worn gear teeth<br>2. Replace components as required. |
| Transfer case shift fork pads broken or missing | **NOTE:**<br>**A growl, rattle, or grinding noise that occurs when a shift is commanded may be caused by broken or missing shift fork pads which may lead to incomplete engagement of the synchronizer teeth. Refer to High/Low Shift Components Cleaning and Inspection, and Two/Four Wheel Drive Shift Components Cleaning** |

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| Cause | Correction |
| --- | --- |
| | and Inspection.<br><br>Replace the shaft forks and pads as required. Refer to Transfer Case Disassemble, and Transfer Case Assemble. |
| Transfer case high/low clutch gear tooth damage | NOTE:<br>Excessive gear tooth damage may cause a will not shift or gear clash when shifting condition.<br><br>1. Inspect the gear teeth for excessive damage. Refer to High/Low Shift Components Cleaning and Inspection.<br>2. Inspect the splines of the high/low clutch and rear output shaft to ensure the clutch moves freely on the shaft.<br>3. Replace components as required. |
| Transfer case high/low planetary carrier assembly | NOTE:<br>In situations where there is excessive input shaft gear teeth wear, it may not be possible to engage 4LO.<br><br>1. Inspect the planetary gears and high/low internal gear for wear or damage. Refer to High/Low Planetary Carrier Cleaning and Inspection.<br>2. Inspect the input shaft gear teeth for wear or damage<br>3. Replace components as required. |

## TRANSFER CASE DIFFICULT TO SHIFT - COLD AMBIENT TEMPERATURE

| Cause | Correction |
| --- | --- |
| DEFINITION: A RPO-NQG manual shift transfer case that is difficult to shift from 2 HI to 4 HI or there is a gear clashing when shifting from HI to LO modes in cold ambient temperature conditions. Some customers may comment about the effort required to shift from 2 HI to 4 HI in cold ambient temperatures at -6 Â°C (20 Â°F) or below.<br><br>1. Review the correct owners manual shifting procedures with the customer.<br>2. Inspect the front axle and transfer case for the correct fluid levels. | |

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| Cause | Correction |
| --- | --- |
| 3. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br><br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Front Axle Oil - Thick Viscosity during Cold Ambient Temperature Conditions | **NOTE:**<br>• **In cold ambient temperature conditions, the fluid in the front axle (either mineral or synthetic) becomes very thick. The thick oil makes it difficult to rotate the ring and pinion gears inside the front axle. The synchronizer inside the transfer case cannot overcome this hard-to-rotate front axle condition because it has to accelerate the front axle ring and pinion gears up to vehicle speed before a shift from 2 HI to 4 HI can be completed.**<br>• **When this condition occurs, it is recommended to either stop the vehicle to complete the** |

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| Cause | Correction |
|---|---|
| | **shift or to continue driving until the front axle fluid warms up. Once the front axle fluid has warmed up (to a reduced viscosity) the shift can be completed.**<br><br>1. Operate the vehicle to observe the condition.<br>2. If the condition is present, attempt to perform a shift with the vehicle stopped. If the vehicle when stopped, performs the shift properly, there is no repair necessary. This is to be considered a normal operating characteristic of the 4WD system. |

## TRANSFER CASE JUMPS OUT OF GEAR

| Cause | Correction |
|---|---|
| Definition: loss of the transfer case drive torque during deceleration, acceleration or under load or the transfer case jumps out of gear and into a neutral position.<br><br>1. Inspect for the correct fluid level.<br>2. Inspect the drain plug for large metal deposits. Small metal flakes and fine metal dust on the plug magnet are to be considered normal.<br><br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. | |
| Transmission or transfer case mounts loose | Inspect the mounts, repair as required |
| Shift control lever assembly worn | Inspect the shift control lever for excessive wear or looseness. Refer to **Transfer Case Control Lever Replacement**. |
| Shift control rod worn or incorrectly adjusted | 1. Inspect for a worn or incorrectly adjusted shift control rod.<br>2. Replace components as required. Refer to **Transfer Case Control Lever Replacement**, and **Transfer Case Control Rod Replacement**. |
| Transfer case shift lever loose | Inspect the shift lever located on the side of the transfer case for a loose fit to the shift shaft |
| Transfer case shift fork broken or fork pads broken or missing | **NOTE:**<br>**A growl, rattle, or grinding noise that** |

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| Cause | Correction |
|---|---|
| | **occurs when a shift is commanded may be caused by broken or missing shift fork pads which may lead to incomplete engagement of the synchronizer teeth. Refer to High/Low Shift Components Cleaning and Inspection, and Two/Four Wheel Drive Shift Components Cleaning and Inspection.**<br><br>Replace the shaft forks and pads as required. 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.<br>Review the **Symptoms - Transfer Case** and perform the necessary inspections. See below for suggested diagnostic method(s). | |
| **Special Tools**<br>**GE 28431-6** Fluorescent Oil Dye<br>**GE 28428-E** High Intensity Black Light Kit<br>For equivalent regional tools, refer to **Special Tools**.<br><br>**Fluorescent Dye Method**<br><br>1. Add **GE 28431-6** Fluorescent dye to the transmission or transfer case to determine the source of the leak.<br>2. Operate the vehicle.<br>3. Inspect for the presence of dye within the oil leak using the **GE 28428-E** High Intensity Black Light Kit. A presence or non-presence of dye within the oil leak will indicate which component is the source | |

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| Cause | Correction |
| --- | --- |
| of the leak.<br><br>**Powder Method**<br><br>**CAUTION:**<br>**Do not clean using brake cleaner or other reactive solvents as these solvents can damage rubber gaskets, seals and bushings.**<br><br>1. Thoroughly clean the suspected leak area using a rag.<br>2. Apply an aerosol type leak tracing powder to the suspected leak area.<br><br>**NOTE:**<br>**Do not drive the vehicle on the freeway as this will splatter oil inhibiting leak diagnosis.**<br><br>3. Operate the vehicle for 15-20 minutes under city driving conditions until normal operating temperatures are reached.<br>4. Shut OFF the engine.<br>5. Inspect the suspected leak area.<br>6. Trace the leak path through the powder in order to find the source of the leak. | |
| Transfer case overfill condition (wet cavity applications) | **NOTE:**<br>• **Wet cavity adapter applications include transmission RPOs MW7/M99 /M30/M32/M70.**<br>• **Dry cavity** |

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| Cause | Correction |
| --- | --- |
| | **adapter applications include transmission RPOs MYC/MYD.**<br>• **If a transfer case overfill condition is present in a wet cavity adapter application, and the fluid level within the transmission is low, the source of the leak may be a faulty transfer case input shaft oil seal.**<br>1. Inspect for a transfer case for an overfill condition<br>1. Add **J-28431-6** Fluorescent Dye to the transmission to determine if the transfer case input shaft oil seal is the cause of the overfill.<br>2. Operate the vehicle<br>3. Inspect the transfer case fluid for presence of dye within the oil using the **J-28428-E** High Intensity Black Light Kit.<br>2. If fluorescent dye is present within the transfer case fluid, replace the transfer case input shaft oil seal. Refer to **Input Shaft Seal Replacement (Light Duty)Input Shaft Seal Replacement (Heavy Duty)**. |
| Transfer case adapter leak - (dry cavity applications) | **NOTE:**<br>• **Dry cavity adapter applications (transmission RPOs MYC/MYD) with a leak at the adapter weep hole location may caused by either a** |

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| Cause | Correction |
| --- | --- |
| | **leaking transmission rear output shaft oil seal or a leaking transfer case input shaft oil seal. The adapter gasket is not the source of the leak.**<br>• **Wet cavity adapter applications (transmission RPOs MW7/M99 /M30/M32/M70) with a leak may be caused by a leaking adapter gasket, adapter damage, or porosity.**<br><br>1. Inspect for a restricted vent hose assembly. Repair as required.<br>2. Add **J28431-6** Fluorescent Dye to the transmission to determine the source of the leak.<br>3. Operate the vehicle<br>4. Inspect the adapter weep hole for a fluid leak and for traces of dye within the oil using the **J-28428-E** High Intensity Black Light Kit<br>5. If fluorescent dye is present within the fluid leak, replace the transmission rear output shaft seal.<br>6. If fluorescent dye is not present within the fluid leak, replace the transfer case input shaft oil seal. Refer to **Input Shaft Seal Replacement (Light Duty)Input Shaft Seal Replacement (Heavy Duty)**. |
| Transfer case adapter leak and/or adapter gasket leak - (wet cavity applications) | **NOTE:**<br>• **Wet cavity adapter applications (transmission RPOs** |

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| Cause | Correction |
| --- | --- |
| | **MW7/M99 /M30/M32/M70) with a leak may be caused by a leaking adapter gasket, adapter damage, or porosity.**<br>• **Dry cavity adapter applications (transmission RPOs MYC/MYD) with a leak at the adapter weep hole location may caused by either a leaking transmission rear output shaft oil seal or a leaking transfer case input shaft oil seal. Neither the adapter or the gasket is the source of the leak.**<br><br>1. Inspect for a restricted vent hose assembly. Repair as required.<br>2. Inspect for a leaking wet cavity adapter gasket, adapter damage, or porosity. Replace the adapter or gasket as required. Refer to **Transfer Case Adapter Replacement (Heavy Duty)Transfer Case Adapter Replacement (Light Duty)**. |
| Vent hose leak | 1. Inspect the transfer case for an overfill condition. Refer to **Transfer Case Fluid Replacement**.<br><br>**NOTE:**<br>**If a transfer case overfill condition is present in a** |

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| Cause | Correction |
| --- | --- |
| | **wet cavity adapter application, the source of the leak may be a faulty transfer case input shaft oil seal. Refer to the transfer case overfill condition diagnosis information within this table.**<br>2. Inspect for a loose, disconnected, restricted, or damaged vent hose assembly.<br>3. Replace components as required. |
| Drain plug or fill plug leak | 1. Inspect for the correct amount and type of sealer on the plugs. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.<br>2. Install the correct sealer onto the threads of the plugs and tighten to the correct torque value. Refer to **Transfer Case Fluid Replacement**. |
| Rear output shaft bearing snap ring access hole plugs leak | Replace the access hole plugs as required. |
| Vehicle speed sensor (VSS) leak | 1. Remove the VSS. Refer to **Vehicle Speed Sensor Replacement (Non Digital)Vehicle Speed Sensor Replacement (Digital)**.<br>2. Inspect the VSS for the following conditions:<br>• Cross threaded<br>• Cut or damaged VSS O-ring seal<br>• VSS over tightened causing deformation of the sensor<br>3. Replace the VSS O-ring seal or sensor as required. |
| Propeller shaft slip yoke cup plug leak | 1. Inspect for a leaking cup plug in the rear of the propeller shaft slip yoke<br>2. Replace the yoke assembly as required. |
| Rear output shaft oil seal leak | 1. Inspect for a restricted vent hose assembly. Repair as required.<br>2. Inspect for a transfer case for an overfill condition.<br>**NOTE:** |

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| Cause | Correction |
| --- | --- |
| | **If a transfer case overfill condition is present in a wet cavity adapter application, the source of the leak may be a faulty transfer case input shaft oil seal. Refer to the transfer case overfill condition diagnosis information within this table.**<br><br>3. Inspect for a leaking rear output shaft oil seal. Refer to **Rear Output Shaft Seal Replacement**<br>4. Inspect the propeller shaft slip yoke sealing surface for excessive wear, rust, or other damage. Minor abrasions may be repaired using very fine emery cloth sandpaper. Refer to **Symptoms - Propeller Shaft** . Check driveshaft info for grit of cloth!<br>5. Inspect the rear output shaft bushing for excessive wear. Refer to **Transfer Case Rear Extension Bushing Replacement**.<br>6. Replace components as required. |
| Front output shaft oil seal leak | 1. Inspect for a restricted vent hose assembly. Repair as required.<br>2. Inspect for a transfer case for an overfill condition.<br><br>**NOTE:**<br>**If a transfer case overfill condition is present in a wet cavity adapter application, the source of the leak may be a faulty transfer case input shaft** |

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| Cause | Correction |
| --- | --- |
| | **oil seal. Refer to the appropriate transfer case overfill condition diagnosis information within this table.**<br>3. Inspect for a leaking front output shaft oil seal. Refer to **Front Output Shaft Seal Replacement**.<br>4. Replace components as required. |
| Shift lever seal leaking | 1. Inspect for a leaking shift lever seal.<br>2. Replace the shift lever seal and shift shaft as required. Refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**. |
| Front case half-to-rear case half seam leak | Disassemble the transfer case and reseal the case halves. Refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**. |
| Case leak | 1. Inspect for a cracked case half or case porosity.<br>2. Add **J-28431-6** Fluorescent Dye to the transfer case.<br>3. Operate the vehicle<br>4. Inspect the transfer case fluid leak for presence of dye within the oil using the **J-28428-E** High Intensity Black Light Kit. Refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**. |

## REPAIR INSTRUCTIONS - ON VEHICLE

### TRANSFER CASE SHIFT CONTROL SWITCH REPLACEMENT

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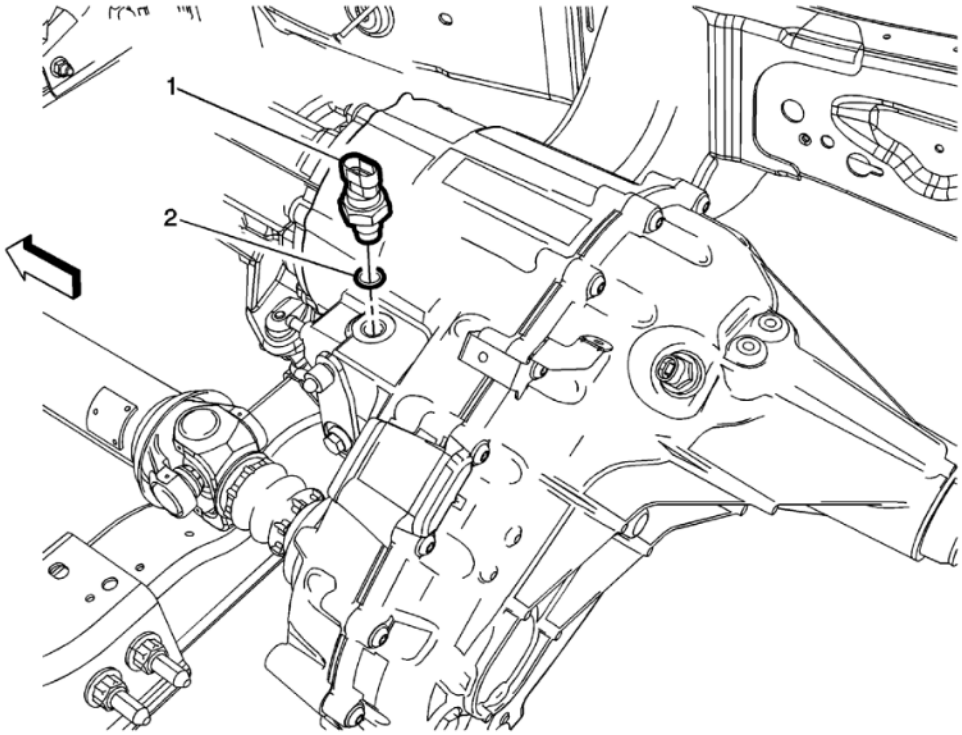



**Fig. 5: Transfer Case Shift Control Switch**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br>1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .<br>2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement**. | |
| 1 | Transfer Case Shift Control Switch Assembly<br>**CAUTION:**<br>**Refer to Component Fastener Tightening Caution** .<br>**Procedure**<br>Disconnect the electrical connector.<br>**Tighten**<br>27 N.m (20 lb ft) |
| 2 | Transfer Case Shift Control Switch Assembly O-Ring<br>**Procedure**<br>Lightly lubricate the O-ring with transfer case fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**. |

## TRANSFER CASE CONTROL LEVER REPLACEMENT

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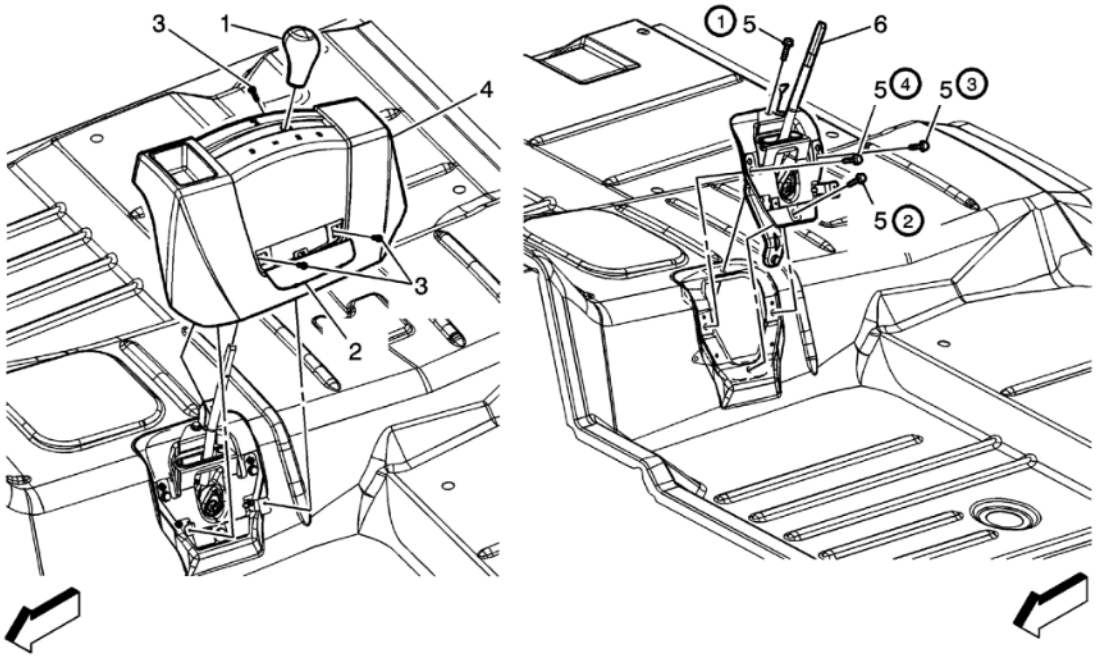



**Fig. 6: Transfer Case Control Lever**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br>1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .<br>2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement**.<br>3. Remove the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .<br>4. Remove the control rod. Refer to **Transfer Case Control Rod Replacement**. | |
| 1 | Transfer Case Control Lever Knob<br>**Procedure**<br>1. Using an adjustable wrench, adjust the wrench to fit the control lever rod just below the knob.<br>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)<br>**CAUTION:**<br>**Refer to Fastener Caution .** |

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| Callout | Component Name |
|---|---|
| | **Tighten**<br>2.5 N.m (22 lb in) |
| 4 | Transfer Case Control Lever Bezel |
| 5 | Transfer Case Control Lever Bolt (Qty: 4)<br><br>**NOTE:**<br>**Tighten bolts in specified sequence.**<br><br>**Tighten**<br>11 N.m (97 lb in) |
| 6 | Transfer Case Control Lever |

## TRANSFER CASE CONTROL ROD REPLACEMENT

### Removal Procedure

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

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

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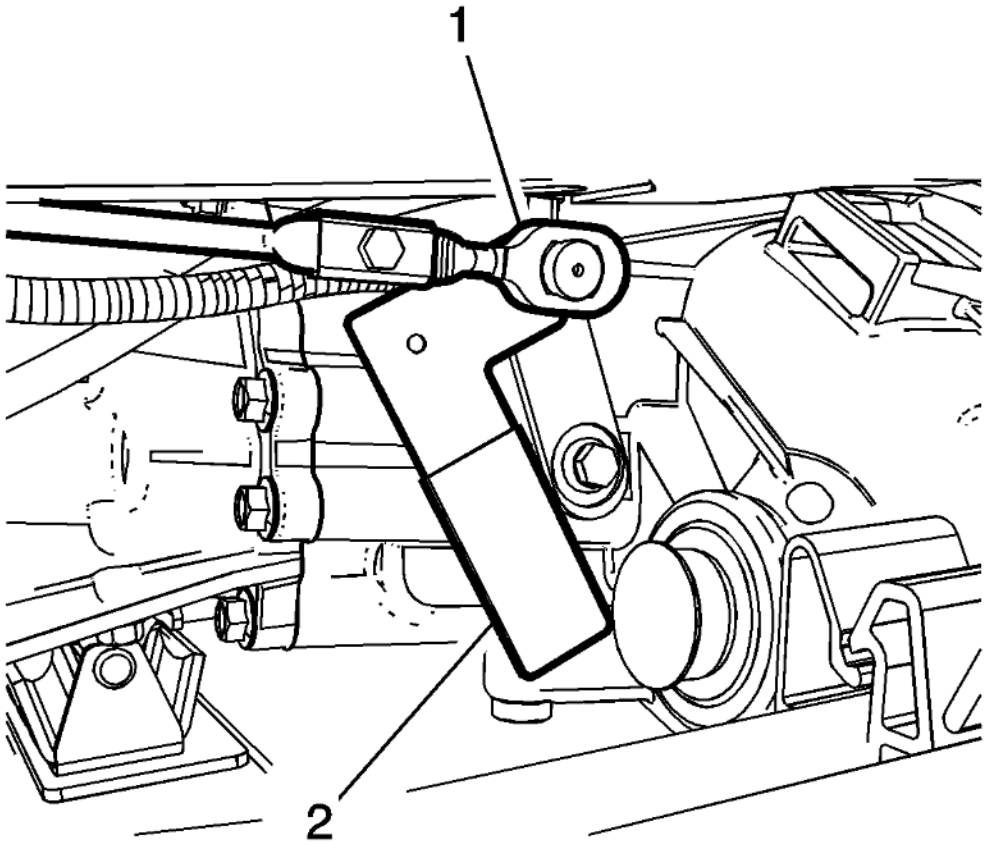



**Fig. 7: Door Trim Panel Tool And Control Rod**
**Courtesy of GENERAL MOTORS COMPANY**

3. Remove the control rod from the control lever using a suitable door trim panel (2) tool to separate the control rod (1) from the ball stud.

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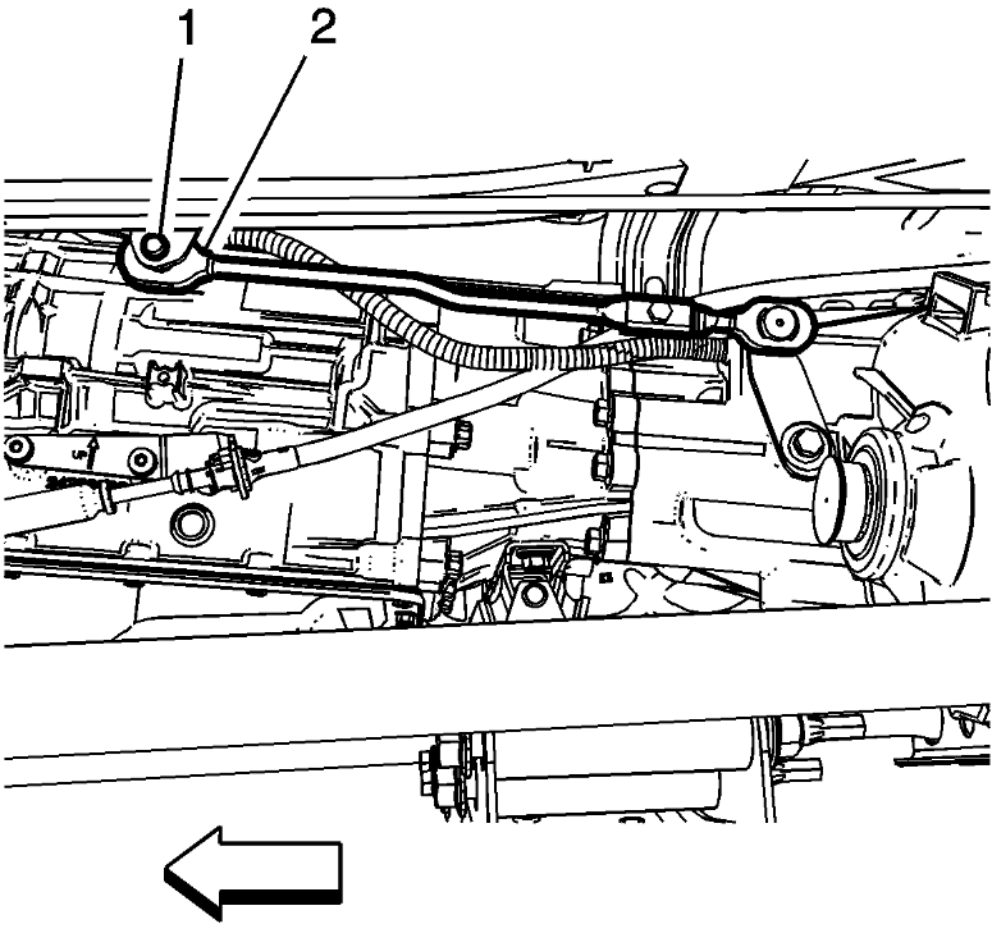



**Fig. 8: Control Rod And Shift Lever**
**Courtesy of GENERAL MOTORS COMPANY**

4. Remove the control rod from the shift lever using a suitable door trim panel tool.
5. Remove the control rod.

### Installation Procedure

**NOTE:**

- **Before installing a NEW control rod, loosen the adjusting bolt on the control rod so it slides with slight resistance.**
- **Clean all grease from the attachment points, The new design control rod with isolated end fitting does NOT use grease.**
- **When installing the control rod on the control levers, a snapping sound should be heard or felt upon installation.**

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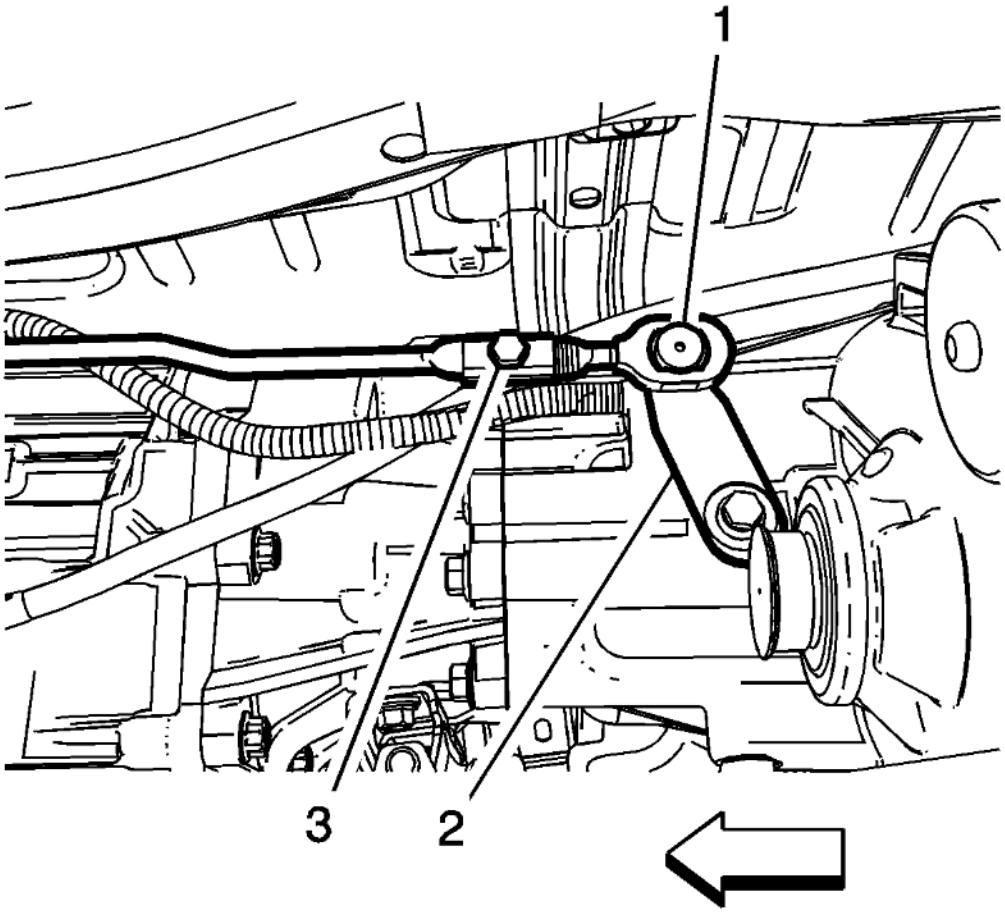



**Fig. 9: Control Rod And Control Lever**
**Courtesy of GENERAL MOTORS COMPANY**

1. Install the control rod (1) onto the control lever (2) first by rolling it over the ball stud until firmly seated.

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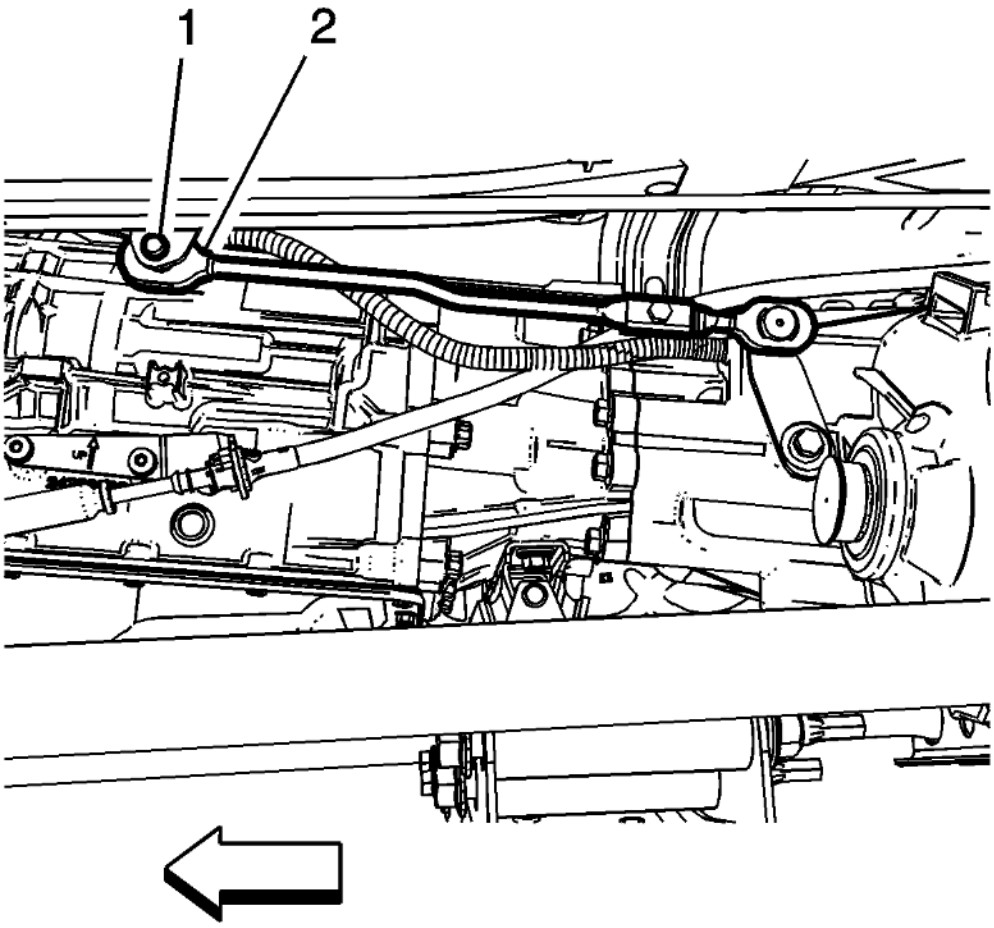



**Fig. 10: Control Rod And Shift Lever**
**Courtesy of GENERAL MOTORS COMPANY**

2. Slide the control rod (2) forward.
3. Install the control rod onto the shift control lever (1) by rolling it over the ball stud until firmly seated.

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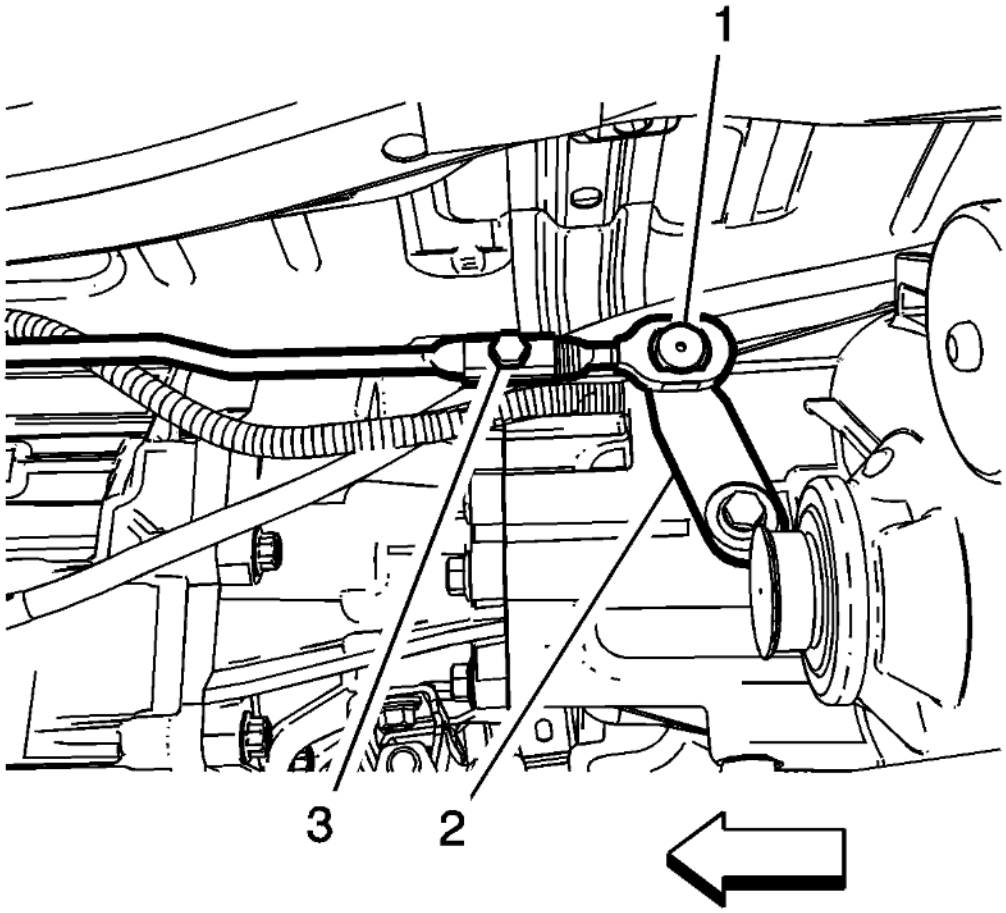



**Fig. 11: Control Rod And Control Lever**
**Courtesy of GENERAL MOTORS COMPANY**

4. Adjust the control rod.
    1. Place the transmission in the PARK position.

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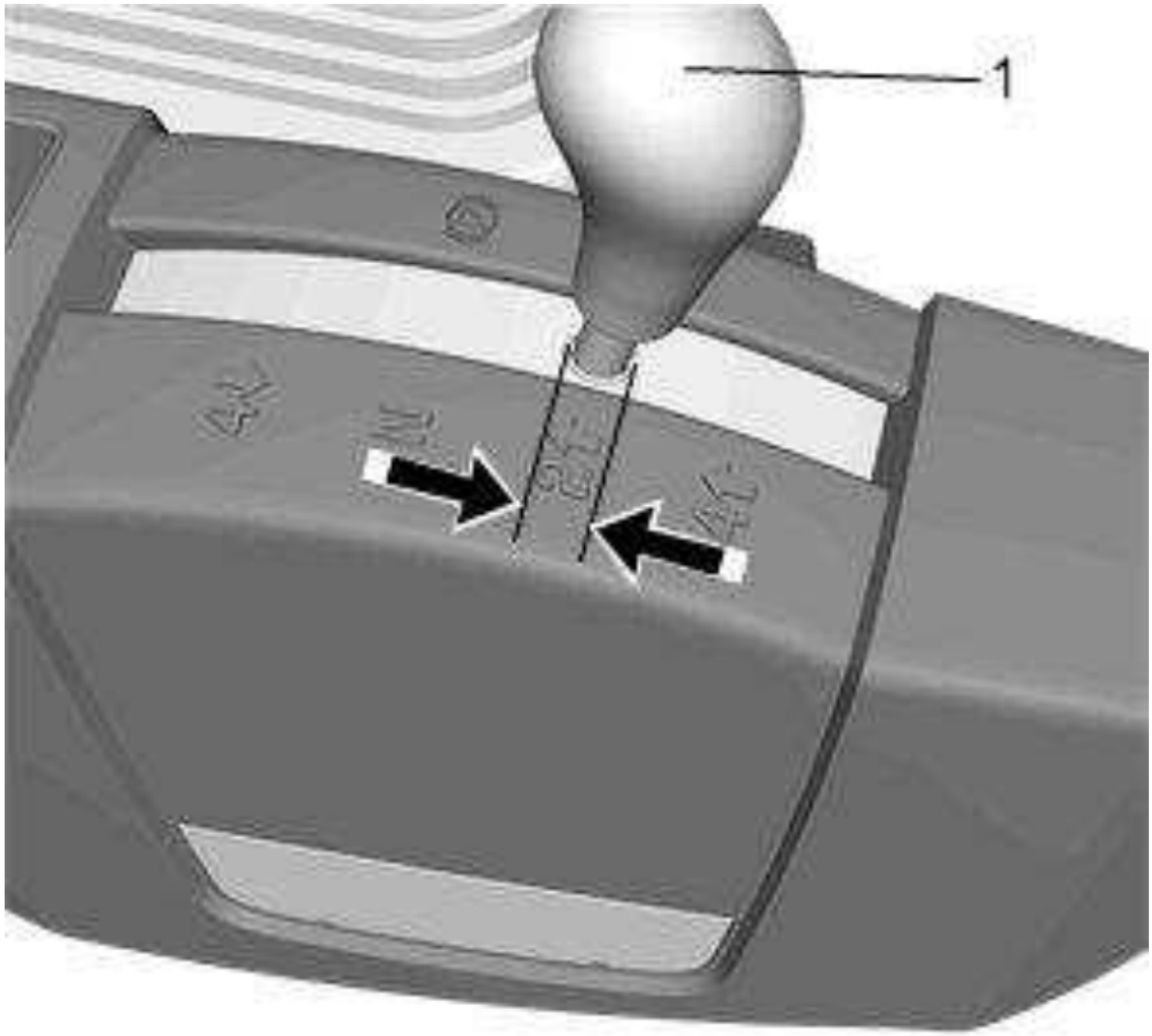



**Fig. 12: 2H Position**
**Courtesy of GENERAL MOTORS COMPANY**

2. Place the transfer case lever (1) in the 2H position as shown.
3. With the aid of another technician "if necessary," have them hold the control lever in the 2H position.
4. Place the transfer case lever (2) into 2H position.
5. Ensure both ends of the control rod are firmly seated on the ball studs.
6. Loosen the control rod adjusting bolt (3).
7. Adjust/readjust the control rod length if needed.

**CAUTION: Refer to Fastener Caution .**

5. Tighten the control rod adjusting bolt (3) to 15 N.m (11 lb ft).

IMPORTANT: If the shift lever is improperly aligned as shown, a diagnostic trouble code will set after two or more transfer case engagements.

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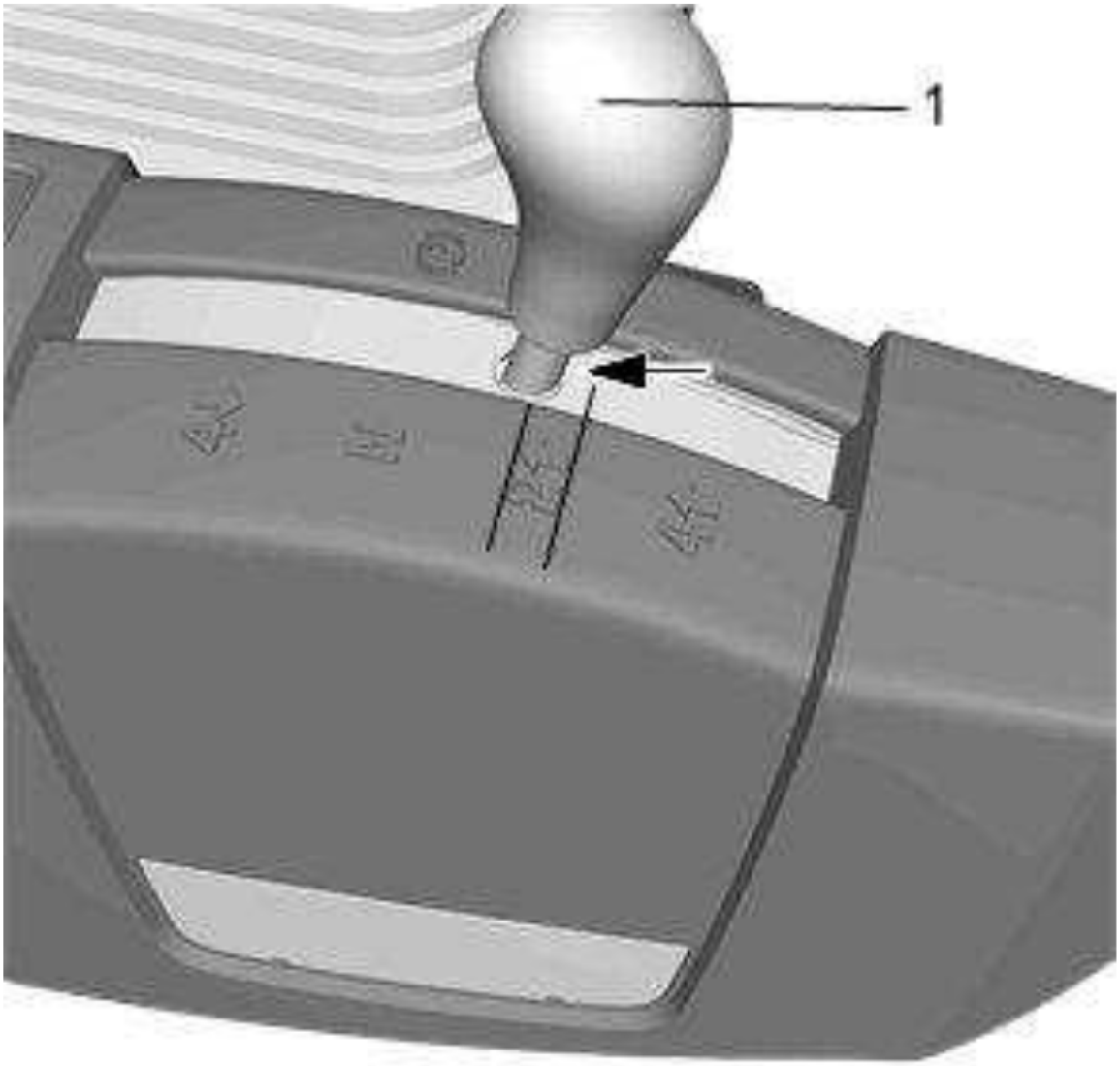



Fig. 13: 2H Position
**Courtesy of GENERAL MOTORS COMPANY**

6. Visually inspect the transfer case lever (1) in the 2H position. If the lever is in any position off of the 2H position as shown, readjust the control rod.
7. Install the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .
8. Install the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement**.

## TRANSFER CASE SHIELD REPLACEMENT

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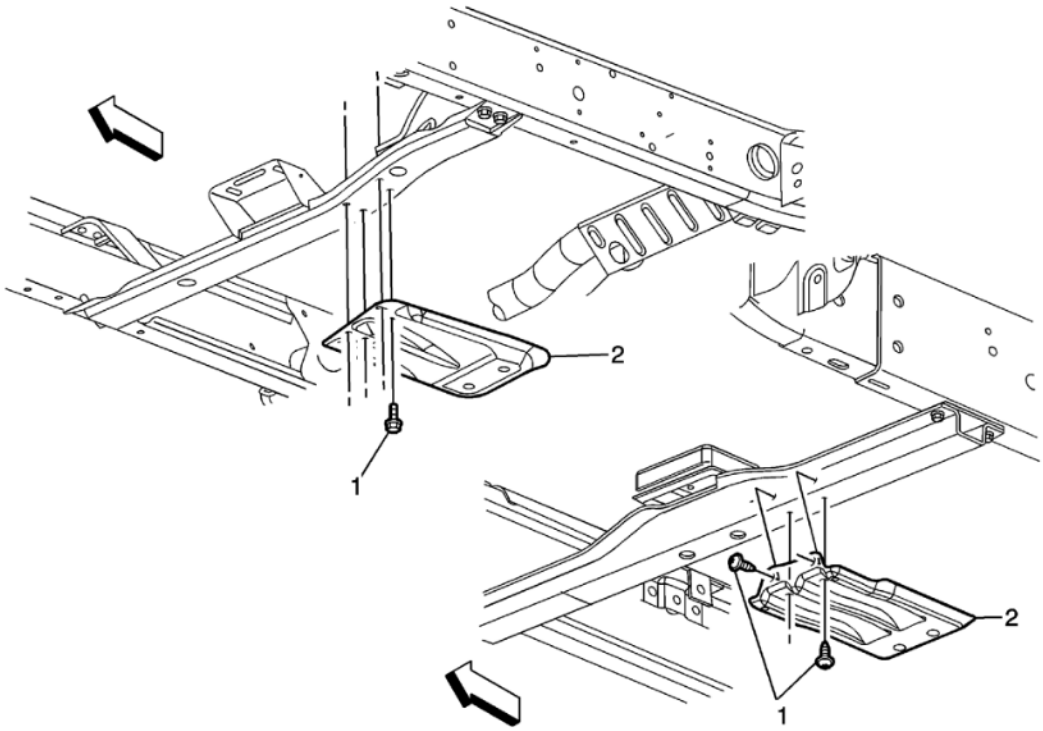



**Fig. 14: Transfer Case Shield**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . | |
| 1 | Transfer Case Shield Bolt<br><br>**CAUTION:**<br>**Refer to**<br>**Fastener Caution** .<br><br>**Tighten**<br>20 N.m (15 lb ft) |
| 2 | Transfer Case Shield |

## TRANSFER CASE FLUID REPLACEMENT

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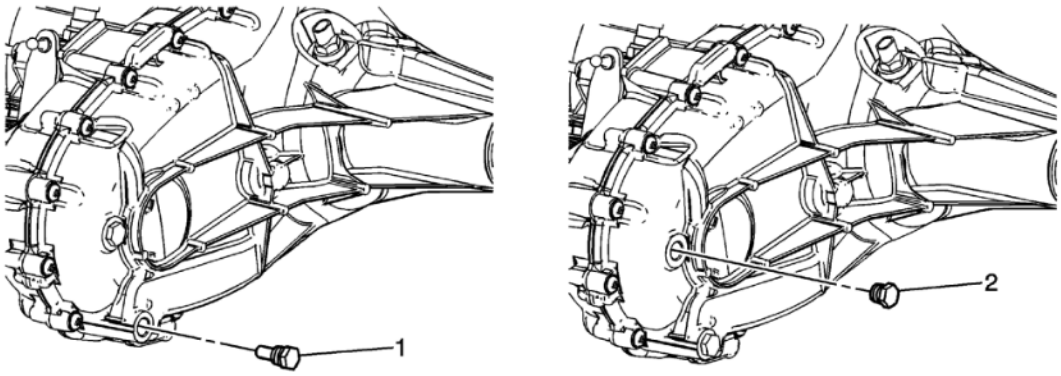



**Fig. 15: View Of Transfer Case Fill Plug & Drain Plug**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br>1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .<br>2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement**. | |
| 1 | Transfer Case Drain Plug<br>**CAUTION:**<br>**Refer to Component Fastener Tightening Caution .**<br>**Procedure**<br>1. Allow the transfer case to drain completely.<br>2. Apply sealant to the plug threads. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.<br>**NOTE:**<br>**When performing the following procedure, use only** |

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| Callout | Component Name |
| --- | --- |
| | **hand tools to remove and install the drain plug.**<br><br>**Tighten**<br>18 N.m (13 lb ft) |
| 2 | Transfer Case Fill Plug<br><br>**Procedure**<br><br>1. Fill the transfer case to the bottom of the fill plug hole with transfer case fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.<br>2. Apply sealant to the plug threads. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.<br><br>**NOTE:**<br>**When performing the following procedure, use only hand tools to remove and install the fill plug.**<br><br>**Tighten**<br>18 N.m (13 lb ft) |

**DRAIN PLUG REPLACEMENT**

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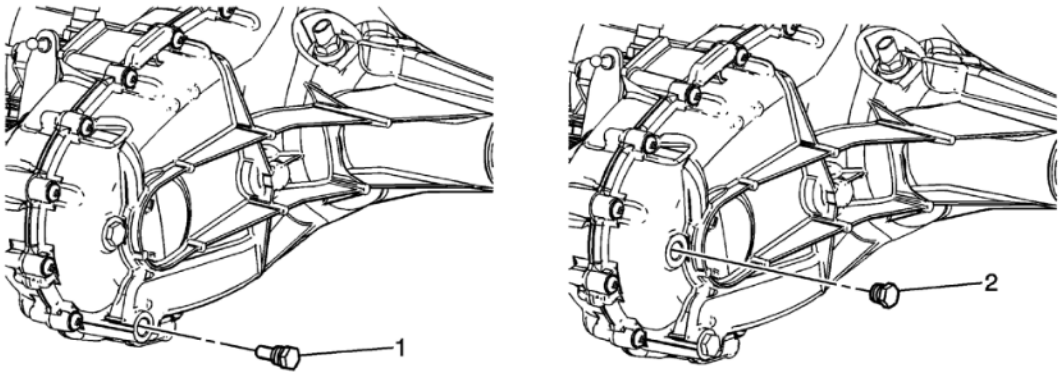



**Fig. 16: View Of Transfer Case Fill Plug & Drain Plug**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br>1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .<br>2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement**. | |
| 1 | Transfer Case Drain Plug<br>**CAUTION:**<br>**Refer to Component Fastener Tightening Caution .**<br>**Procedure**<br>1. Allow the transfer case to drain completely.<br>2. Apply sealant to the plug threads. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.<br>**NOTE:**<br>**When performing the following procedure, use only** |

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| Callout | Component Name |
| --- | --- |
| | **hand tools to remove and install the drain plug.**<br><br>**Tighten**<br>18 N.m (13 lb ft) |
| 2 | Transfer Case Fill Plug<br><br>**Procedure**<br><br>1. Fill the transfer case to the bottom of the fill plug hole with transfer case fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.<br>2. Apply sealant to the plug threads. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.<br><br>**NOTE:**<br>**When performing the following procedure, use only hand tools to remove and install the fill plug.**<br><br>**Tighten**<br>18 N.m (13 lb ft) |

## FILL PLUG REPLACEMENT

### Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

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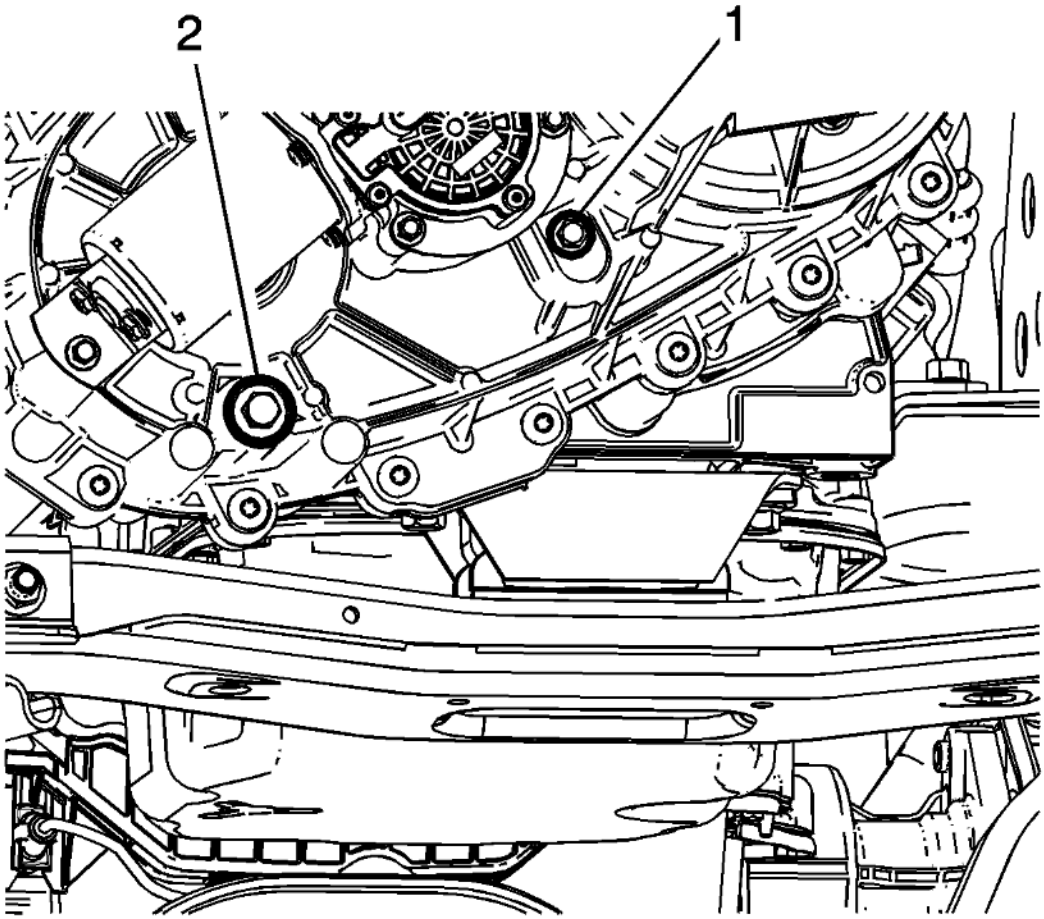



**Fig. 17: Transmission Fluid Drain And Fill Plugs**
**Courtesy of GENERAL MOTORS COMPANY**

2. Remove the fill plug (1).

**Installation Procedure**

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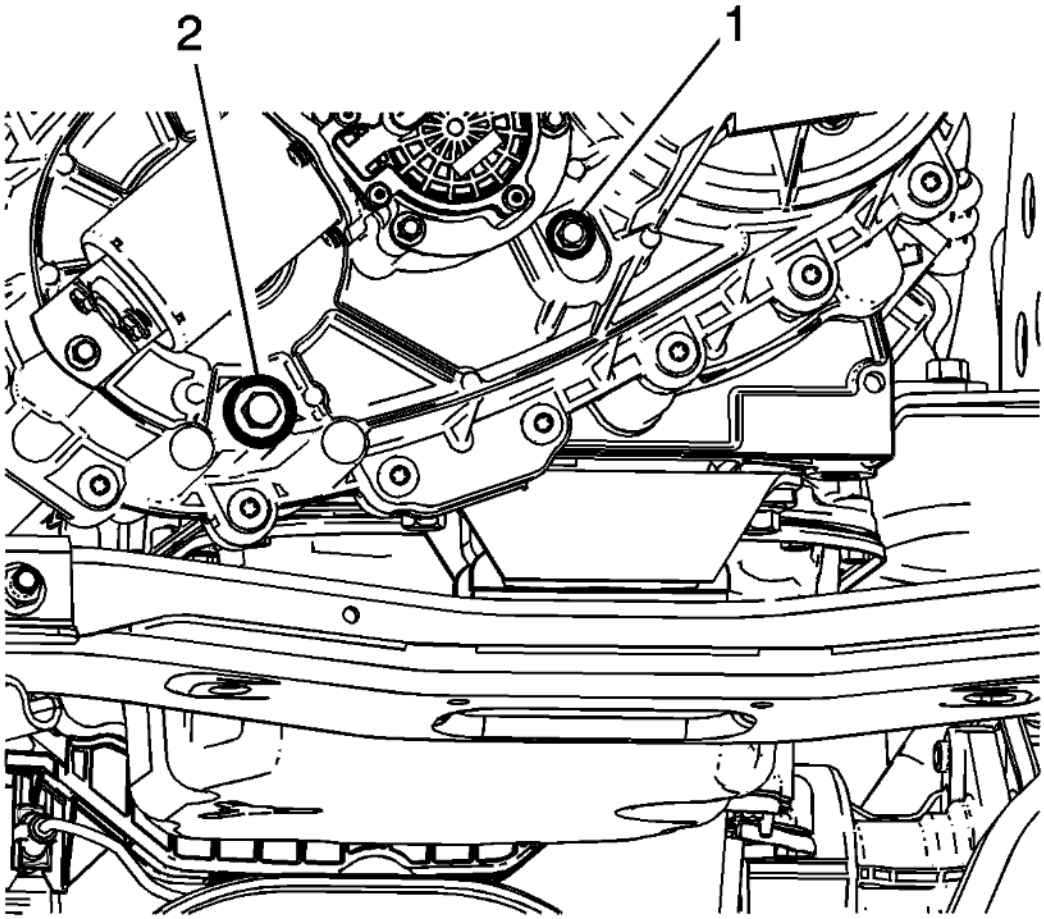



**Fig. 18: Transmission Fluid Drain And Fill Plugs**
**Courtesy of GENERAL MOTORS COMPANY**

**CAUTION: Refer to Fastener Caution .**

1. Install the fill plug (1) and tighten to 18 N.m (13 lb ft).
2. Lower the vehicle.

## FRONT OUTPUT SHAFT SEAL REPLACEMENT

**Special Tools**

- **DT-50649** Seal Installer
- **J-8092** Driver Handle

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

### Removal Procedure

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 Axle Propeller Shaft Replacement** .

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**NOTE:** **Remove the front output shaft seal in two pieces using the following procedure.**

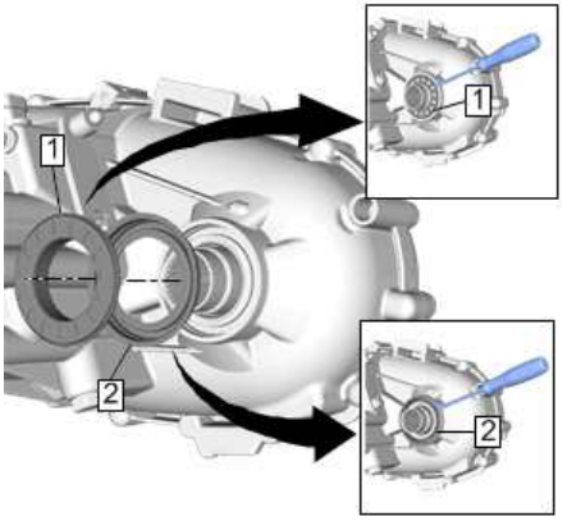



**Fig. 19: Front Output Shaft Slinger And Oil Seal**
**Courtesy of GENERAL MOTORS COMPANY**

4. Insert a screwdriver between the metal inner and metal outer portions of the seal.
5. Pry upward in multiple locations working the metal inner portion of the seal off the shaft until removed.
6. Once the inner metal portion is removed, insert a screwdriver between the outer diameter metal flange of the seal and the housing.
7. Drive the screwdriver inward in multiple locations, the outer portion of the seal will be distorted and can easily be removed from the housing.

**Installation Procedure**

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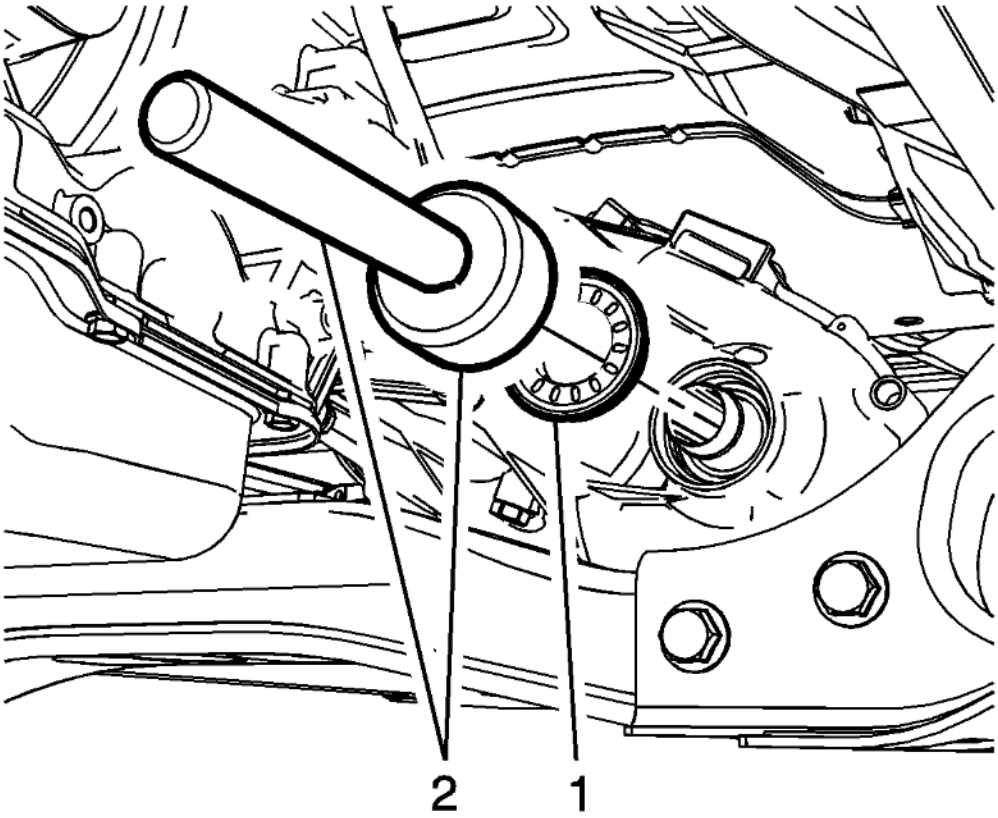



**Fig. 20: Front Output Shaft Oil Seal And Installer**
**Courtesy of GENERAL MOTORS COMPANY**

1. Using the **J-8092** driver handle and **DT-50649** installer (2) install the front output shaft oil seal (1) to the transfer case.

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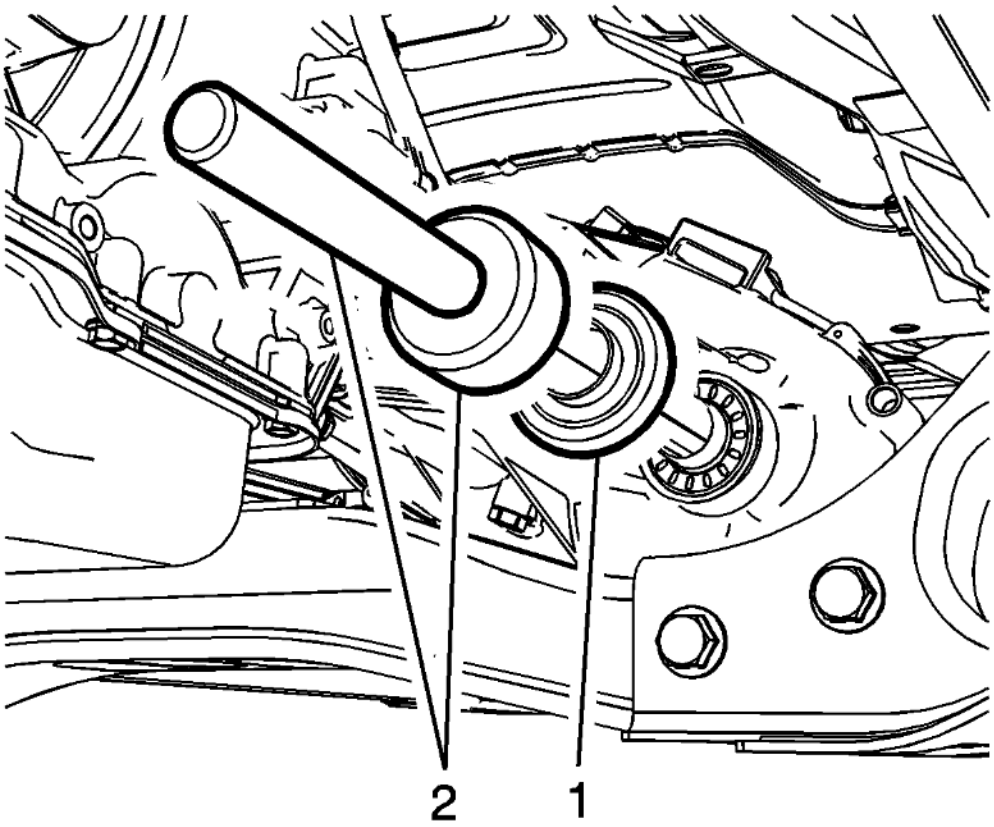



Fig. 21: Front Output Shaft Oil Slinger And Installer
Courtesy of GENERAL MOTORS COMPANY

**NOTE:** **The new design front output shaft oil slinger can be installed onto all current and prior model year applications, providing the new design front output shaft seal is also installed. Refer to Transfer Case Description and Operation .**

2. Using the **J-8092** driver handle and **DT-50649** installer (2) install the front output shaft oil slinger (1) to the transfer case.
3. Install the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .
4. Install the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement**.
5. Lower the vehicle.

## REAR OUTPUT SHAFT SEAL REPLACEMENT

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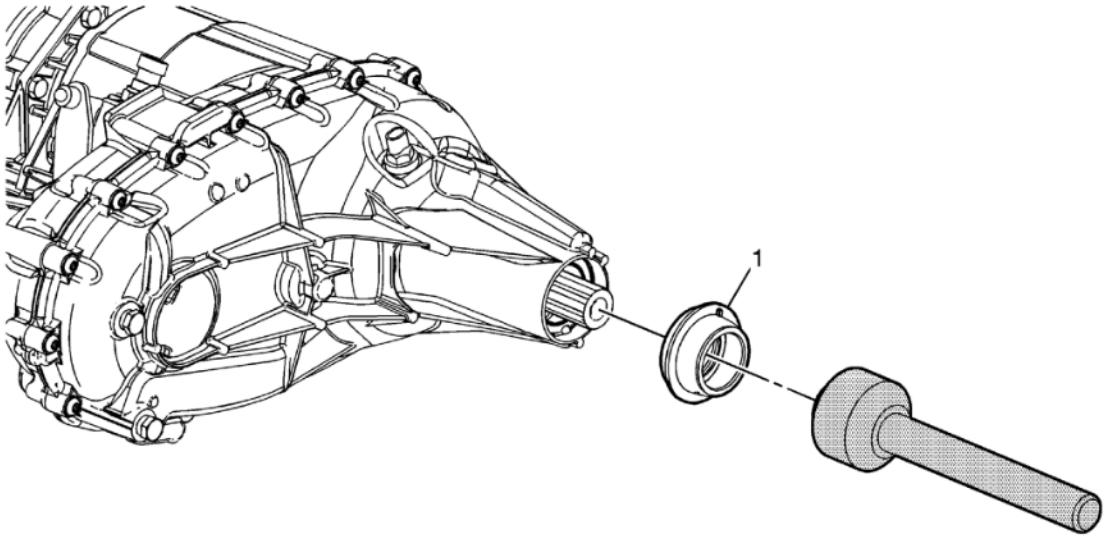



Fig. 22: Rear Output Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name |
|---|---|
| **CAUTION:** **Do not damage the sealing surfaces of the transfer cases or the shafts when prying the seals for removal. Damaging the sealing surface may cause leakage or require replacement of the damaged component.** | |
| **Preliminary Procedure** Remove the rear propeller shaft. Refer to One-Piece Propeller Shaft Replacement , or Two-Piece Propeller Shaft Replacement (MYC, M5U, MSX) Two-Piece Propeller Shaft Replacement (MW7) . | |

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| Callout | Component Name |
|---|---|
| 1 | Transfer Case Output Shaft Seal<br><br>**Procedure**<br><br>1. Remove the seal using an appropriate tool.<br>2. Install the seal with the notch at the top and the weep hole at the bottom.<br><br>**NOTE:**<br>**Use the appropriate seal installer depending on application.**<br><br>**Special Tools**<br><br>• **DT-48021** Seal Installer (Heavy Duty)<br>• **DT-48210** Seal Installer (Light Duty)<br>• **GE-8092** Drive Handle<br><br>For equivalent regional tools, refer to **Special Tools**. |

## TRANSFER CASE REAR EXTENSION BUSHING REPLACEMENT

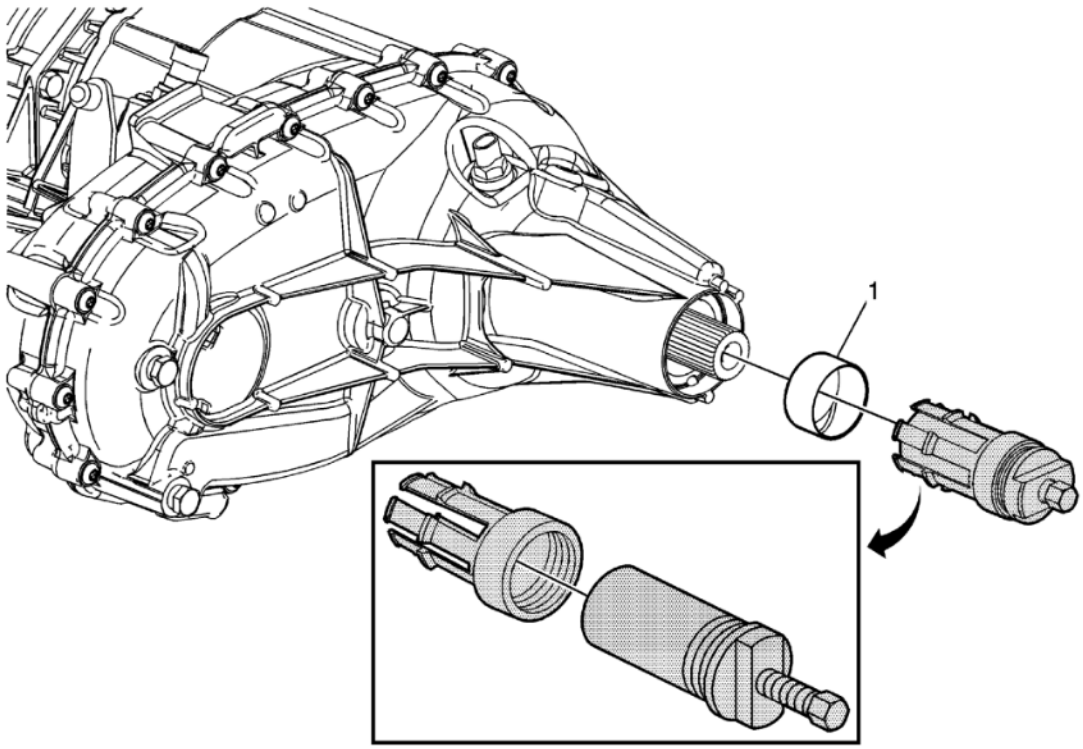



**Fig. 23: Transfer Case Rear Extension Bushing**
**Courtesy of GENERAL MOTORS COMPANY**

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| Callout | Component Name |
| --- | --- |
| **CAUTION:**<br>**Refer to Transfer Case Seal Removal Caution .** | |
| **Preliminary Procedures** Remove the transfer case rear output shaft seal. Refer to **Rear Output Shaft Seal Replacement**. | |
| | Transfer Case Rear Output Shaft Bushing<br><br>**Procedure**<br><br>1. Install the finger section of the **DT-48734** remover and installer (heavy duty) or **J-45380** remover and installer (light duty) in front of the bushing.<br>2. Install the forcing tube assembly into the finger section. Ensure the forcing screw is backed out.<br>3. Using a wrench on the forcing screw, remove the bushing.<br>4. Remove the old bushing from the **DT-48734** remover and installer (heavy duty) or **J-45380** remover and installer (light duty).<br>5. Install the NEW bushing on the finger section of the **DT-48734** remover and installer (heavy duty) or **J-45380** remover and installer (light duty).<br>6. Install the finger section to the forcing tube assembly of the **DT-48734** remover and installer (heavy duty) or **J-45380** remover and installer (light duty).<br>7. Position the bushing and tool to the rear case half.<br>8. Install the bushing until the tool bottoms on the rear case half.<br><br>**NOTE:**<br>• **Use the appropriate bushing tool depending on application.**<br>• **Only remove the bushing if faulty.**<br>• **If the bushing was removed, a new bushing must be installed.**<br>• **Ensure the** |
| 1 | |

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| Callout | Component Name |
|---|---|
| | **bushing is installed squarely into the bushing bore.**<br><br>**Special Tools**<br>• **DT-48734** Transfer Case Rear Bushing Remover and Installer (Heavy Duty)<br>• **J-45380** Transfer Case Rear Bushing Remover and Installer (Light Duty)<br><br>For equivalent regional tools, refer to **Special Tools**. |

## VEHICLE SPEED SENSOR REPLACEMENT (NON DIGITAL)

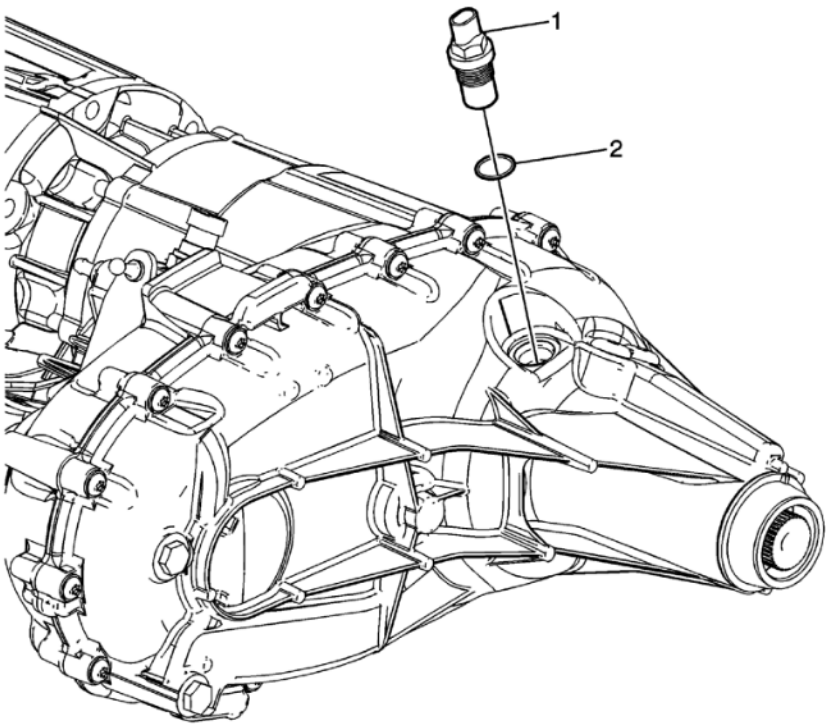



**Fig. 24: View Of Vehicle Speed Sensor & O-Ring**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br><br>1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .<br>2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement**. | |

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| Callout | Component Name |
|---|---|
| 1 | Vehicle Speed Sensor<br><br>**CAUTION:**<br>**Refer to Component Fastener Tightening Caution .**<br><br>**Procedure**<br>Disconnect the vehicle speed sensor electrical connector.<br>**Tighten**<br>17 N.m (13 lb ft) |
| 2 | Vehicle Speed Sensor O-Ring<br>**Procedure**<br>Lightly lubricate the O-ring with clean transfer case fluid. Refer to **Adhesives, Fluids, Lubricants, and Sealers**. |

## VEHICLE SPEED SENSOR REPLACEMENT (DIGITAL)

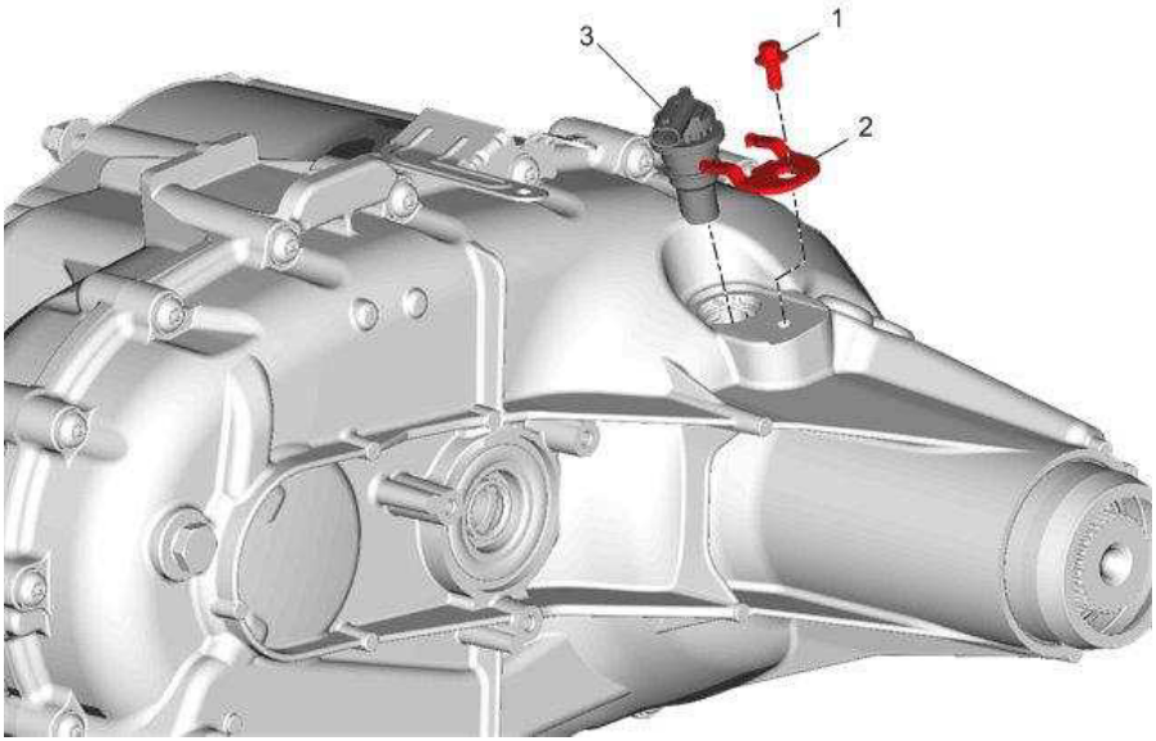



**Fig. 25: Vehicle Speed Sensor (Digital)**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br><br>1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .<br>2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement**. | |

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## TRANSFER CASE ASSEMBLY REPLACEMENT

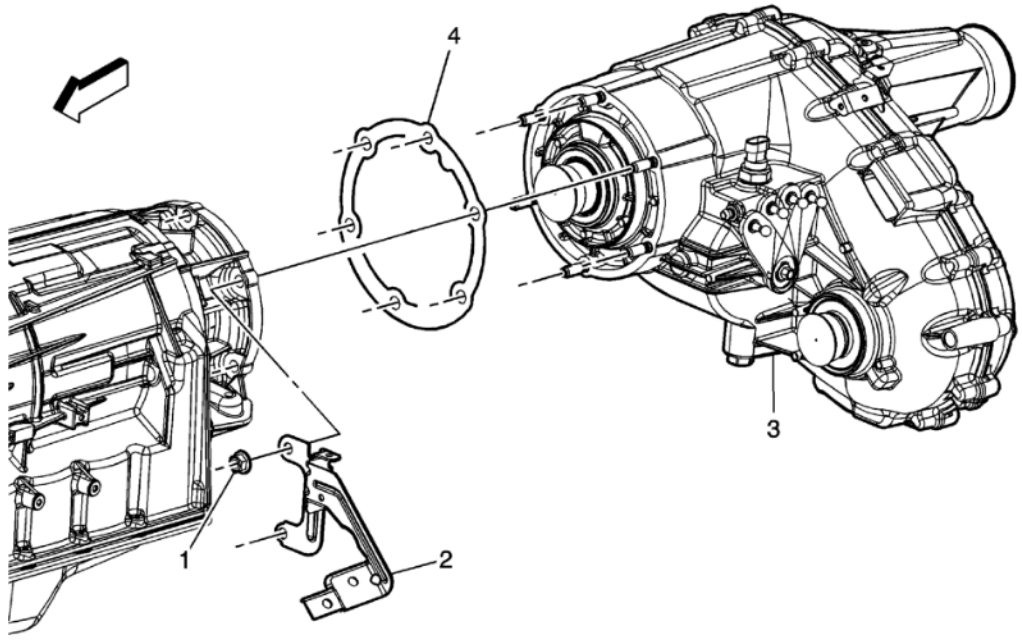



**Fig. 26: View Of Transfer Case, Gasket, Fuel Line Bracket & Nut**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br>1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .<br>2. Remove the transfer case shield, if equipped. Refer to **Transfer Case Shield Replacement**.<br>3. Remove the rear propeller shaft. Refer to **One-Piece Propeller Shaft Replacement** , or **Two-Piece Propeller Shaft Replacement (MYC, M5U, MSX)** **Two-Piece Propeller Shaft Replacement (MW7)** .<br>4. Remove the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .<br>5. Drain the fluid from the transfer case. Refer to **Transfer Case Fluid Replacement**.<br>6. Disconnect the electrical connectors and remove the electrical harness from the transfer case.<br>7. Disconnect the shift control rod from the transfer case. Refer to **Transfer Case Control Rod Replacement**.<br>8. Remove the crossmember. Refer to **Transmission Support Crossmember Replacement (2WD - Light Duty)** **Transmission Support Crossmember Replacement (2WD - Heavy Duty)** **Transmission Support Crossmember Replacement (4WD - Light Duty)** **Transmission Support Crossmember Replacement (4WD - Heavy Duty)** .<br>9. Remove the transmission mount. Refer to **Transmission Mount Replacement (Two Wheel Drive)** **Transmission Mount Replacement (Four Wheel Drive)** , for the 6L50/6L80/6L90 automatic transmission or **Transmission Mount Replacement** for the Allison automatic transmission . | |
| 1 | Transfer Case Nut |

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| Callout | Component Name |
|---|---|
| | **CAUTION:**<br>**Refer to**<br>**Fastener**<br>**Tighten**<br>**Caution** .<br>50 N.m (37 lb ft) |
| 2 | Fuel Line Bracket |
| 3 | Transfer Case |
| 4 | Transfer Case Gasket<br><br>**Procedure**<br><br>1. Install a NEW gasket without the use of any type of sealant or lubricant.<br>2. For MYC and MYD transmissions (dry cavity) applications only, apply lubricant meeting GM Specification 9985830 to the input shaft splines. Refer to **Adhesives, Fluids, Lubricants, and Sealers**. |

## TRANSFER CASE ADAPTER REPLACEMENT (HEAVY DUTY)

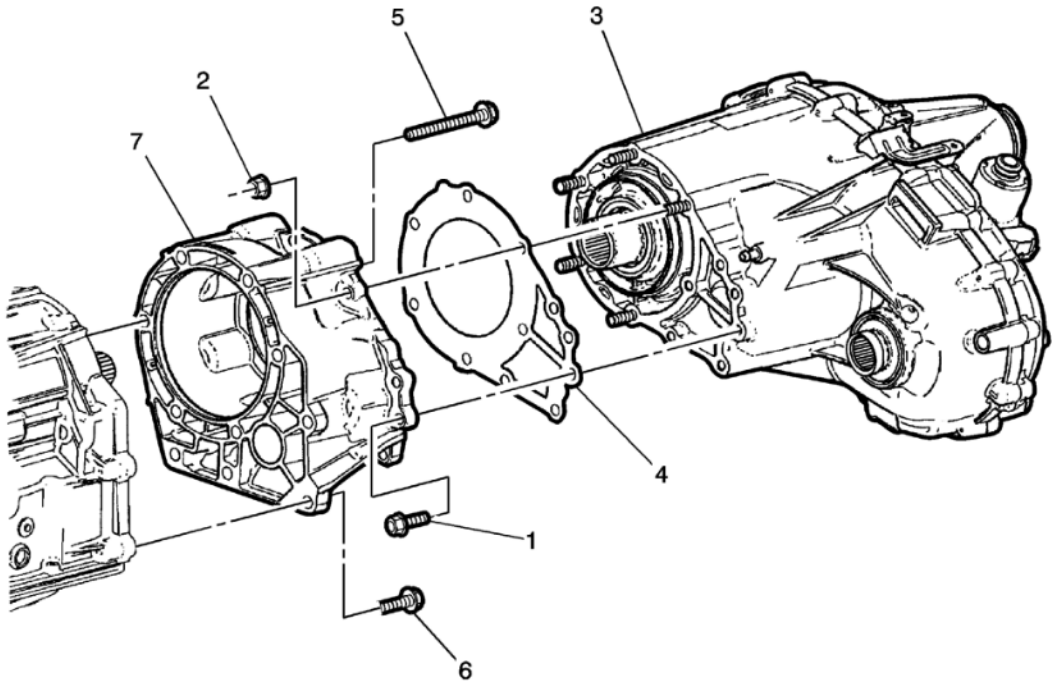



**Fig. 27: Transfer Case Adapter (With Allison Transmission)**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br><br>1. Remove the transfer case. Refer to **Transfer Case Assembly Replacement**.<br>2. Remove the transmission mount. Refer to **Transmission Mount Replacement (Two Wheel Drive)** **Transmission Mount Replacement (Four Wheel Drive)** for the 6L45/6L50/6L80/6L90 transmission. | |

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| Callout | Component Name |
|---|---|
| 1 | Transfer Case Adapter to Transfer Case Bolt (Qty: 6)<br><br>**CAUTION:**<br>**Refer to**<br>**Fastener Caution** .<br><br>**Tighten**<br>50 N.m (37 lb ft) |
| 2 | Transfer Case Nut<br>**Tighten**<br>50 N.m (37 lb ft) |
| 3 | Transfer Case |
| 4 | Transfer Case to Adapter Gasket |
| 5 | Transfer Case to Transmission Bolts<br>**Tighten**<br>50 N.m (37 lb ft) |
| 6 | Transfer Case to Transmission Bolt<br>**Tighten**<br>50 N.m (37 lb ft) |
| 7 | Transfer Case Adapter |

## TRANSFER CASE ADAPTER REPLACEMENT (LIGHT DUTY)

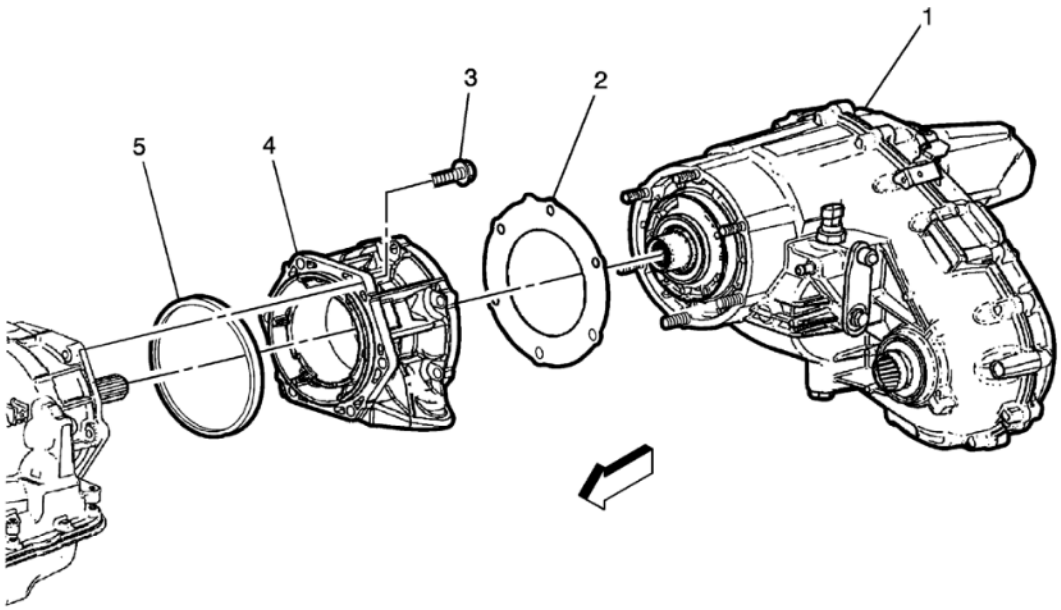



**Fig. 28: Transfer Case Adapter**
**Courtesy of GENERAL MOTORS COMPANY**

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| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br>1. Remove the transfer case. Refer to **Transfer Case Assembly Replacement**.<br>2. Remove the transmission mount. Refer to **Transmission Mount Replacement (Two Wheel Drive)** **Transmission Mount Replacement (Four Wheel Drive)** . | |
| 1 | Transfer Case |
| 2 | Gasket |
| 3 | Transfer Case Adapter Bolt (Qty: 6)<br>**CAUTION:**<br>**Refer to Fastener Caution .**<br>**Tighten**<br>50 N.m (37 lb ft) |
| 4 | Extension Housing |
| 5 | Seal<br>**NOTE:**<br>**Seal is only used for the 4L60-E transmission and should be replaced when the adapter is removed. Do Not use any type of sealant or adhesive in place of or with the seal.** |

## INPUT SHAFT SEAL REPLACEMENT (LIGHT DUTY)

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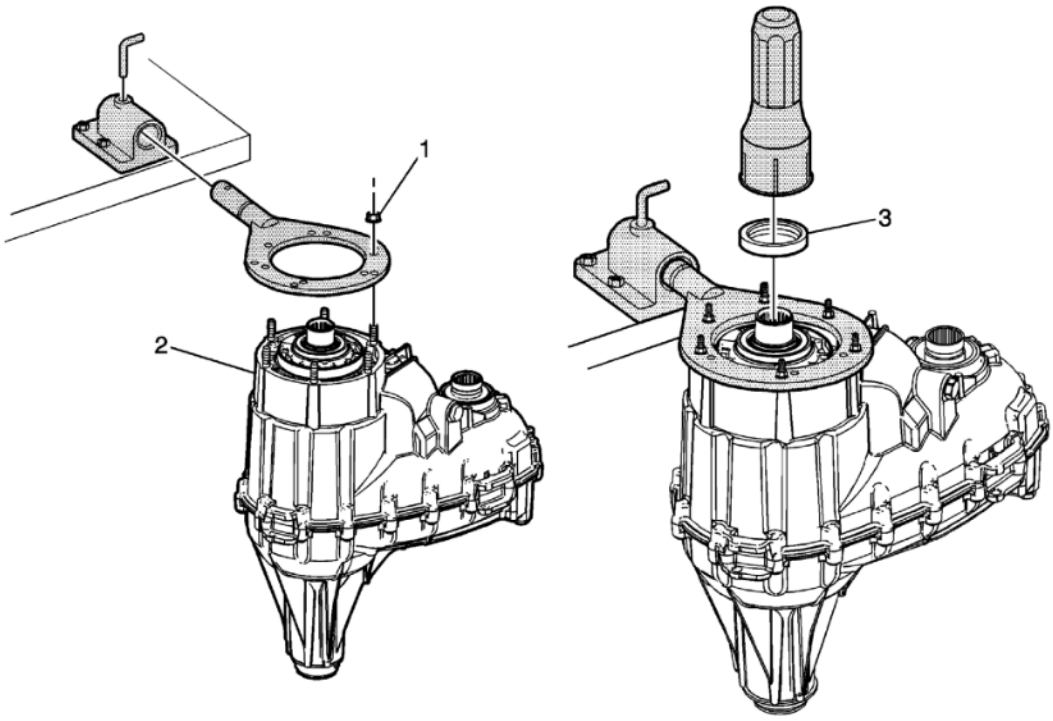



**Fig. 29: View Of Transfer Case, Input Shaft Seal & Nuts**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **CAUTION:** **Do not damage the sealing surfaces of the transfer cases or the shafts when prying the seals for removal. Damaging the sealing surface may cause leakage or require replacement of the damaged component.** **Preliminary Procedure** Remove the transfer case. Refer to **Transfer Case Assembly Replacement**. | |
| 1 | Transfer Case Nut<br>**Procedure**<br>Use transfer case nuts to secure transfer case to assembly fixture **J 45759** assembly fixture. |

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| Callout | Component Name |
|---|---|
| | **Special Tools**<br>**J 45759** Assembly Fixture<br>For equivalent regional tools, refer to **Special Tools**. |
| 2 | Transfer Case<br>**Procedure**<br>Insert the transfer case and assembly fixture into the bench holding fixture **J 3289-20** holding fixture and secure with pivot pin.<br>**Special Tools**<br>**J 3289-20** Holding Fixture<br>For equivalent regional tools, refer to **Special Tools**. |
| 3 | Transfer Case Input Shaft Seal<br><br>**Procedure**<br><br>1. Remove the seal using an appropriate tool. Refer to **Transfer Case Disassemble**.<br>2. Install the seal using **J 42738** seal installer or optional **DT 50648-A** seal installer.<br><br>**NOTE:**<br><br>• **Ensure the bore of the front case half is free of dirt, oil, and cleaning solvent.**<br>• **Double lip input shaft oil seals are used on applications with a WET adapter cavity.**<br>• **Single lip input shaft oil seals are used on applications with a DRY adapter cavity and with 6 speed transmission and are to be installed with the spring portion of the seal facing** |

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| Callout | Component Name |
|---|---|
| | **inward towards the internals of the transfer case.**<br><br>**Special Tools**<br>• **DT 50648-A** Seal Installer<br>• **J 42738** Seal Installer<br><br>For equivalent regional tools, refer to **Special Tools**. |

## INPUT SHAFT SEAL REPLACEMENT (HEAVY DUTY)

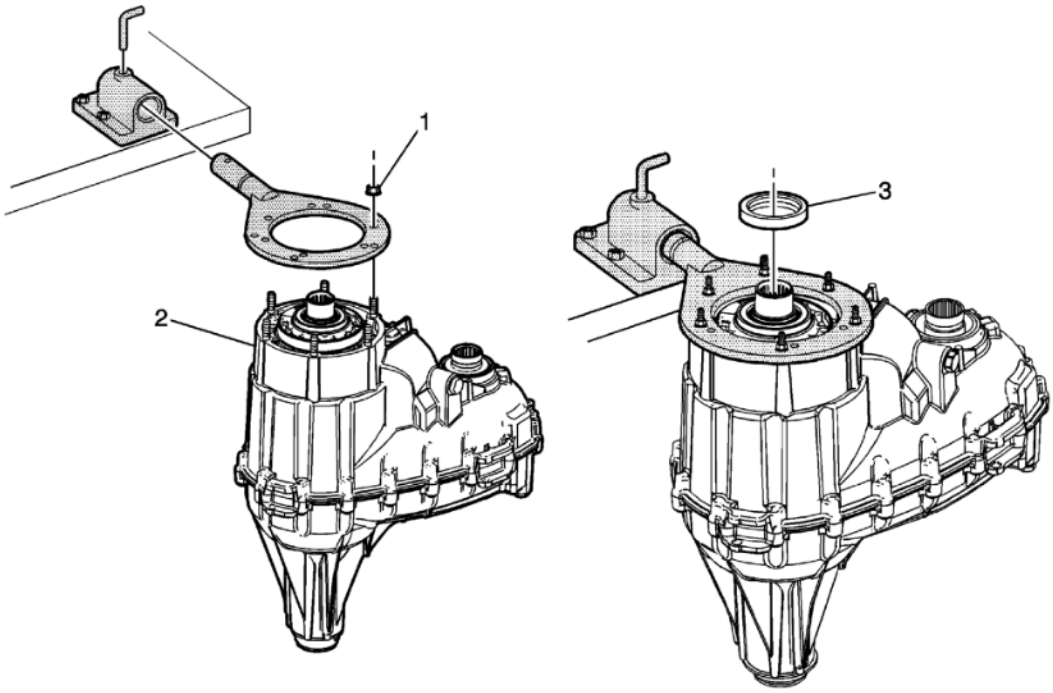



**Fig. 30: Input Shaft Seal (Heavy Duty)**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **CAUTION:**<br>**Do not damage the sealing surfaces of the transfer cases or the shafts when** | |

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| Callout | Component Name |
| --- | --- |
| **prying the seals for removal. Damaging the sealing surface may cause leakage or require replacement of the damaged component.** | |
| **Preliminary Procedure** Remove the transfer case. Refer to **Transfer Case Assembly Replacement**. | |
| 1 | Transfer Case Nut<br>**Procedure**<br>Use transfer case nuts to secure transfer case to assembly fixture **J 45759** assembly fixture.<br>**Special Tools**<br>**J 45759** Assembly Fixture<br>For equivalent regional tools, refer to **Special Tools**. |
| 2 | Transfer Case<br>**Procedure**<br>Insert the transfer case and assembly fixture into the bench holding fixture **J 3289-20** holding fixture and secure with pivot pin.<br>**Special Tools**<br>**J 3289-20** Holding Fixture<br>For equivalent regional tools, refer to **Special Tools**. |
| 3 | Transfer Case Input Shaft Seal<br><br>**Procedure**<br><br>1. Remove the seal using an appropriate tool. Refer to **Transfer Case Disassemble**.<br>2. Install the seal using **DT 50648-A** seal installer .<br><br>**NOTE:**<br><br>• **Ensure the bore of the front case half is free of dirt, oil, and cleaning solvent.**<br>• **Double lip input shaft oil seals are used on applications with a WET adapter** |

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| Callout | Component Name |
| --- | --- |
| | cavity.<br>• Single lip input shaft oil seals are used on applications with a DRY adapter cavity and with 6 speed transmission and are to be installed with the spring portion of the seal facing inward towards the internals of the transfer case.<br><br>**Special Tools**<br>**DT 50648-A** Seal Installer<br>For equivalent regional tools, refer to **Special Tools**. |

## REPAIR INSTRUCTIONS - OFF VEHICLE

### TRANSFER CASE DISASSEMBLE

#### Transfer Case Holding Fixture Installation

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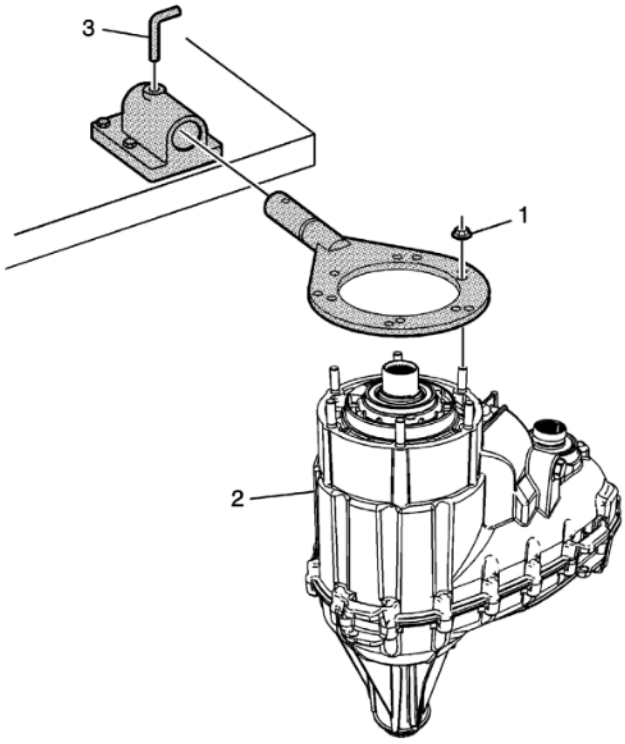



**Fig. 31: View Of Pivot Pin, Transfer Case & Nuts**
**Courtesy of GENERAL MOTORS COMPANY**

**Transfer Case Holding Fixture Installation**

| Callout | Component Name |
|---|---|
| 1 | Transfer Case Nut<br>**Special Tools**<br>**J-45759** Assembly Fixture<br>Equivalent regional tools:**Special Tools** |
| 2 | Transfer Case<br>**Special Tools**<br>**J-3289-20** Holding Fixture<br>Equivalent regional tools:**Special Tools** |
| 3 | Pivot Pin<br>**NOTE:**<br>• **Always secure with the pivot pin after rotating.**<br>• **The transfer case can be rotated 360 degrees to** |

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| Callout | Component Name |
|---|---|
| | facilitate<br>repair. |

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

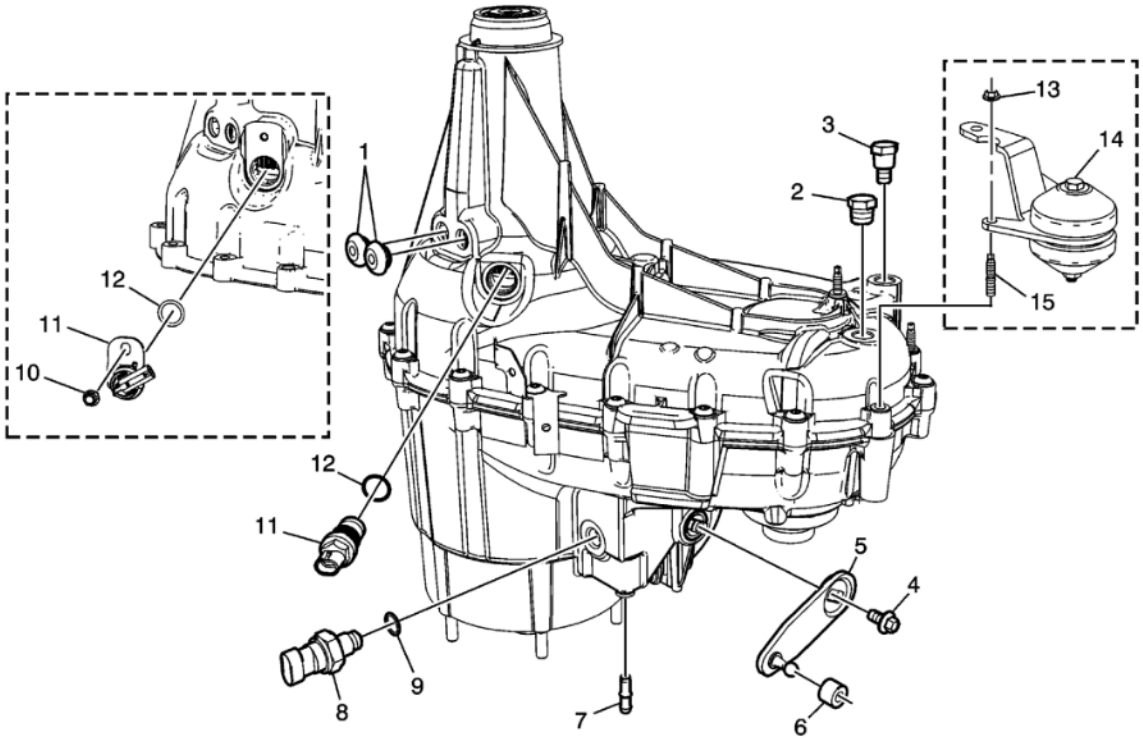



Fig. 32: Access Hole Plugs, Fill and Drain Plug, Lever, Vent, Shift Control Switch, and Vehicle Speed Sensor
Courtesy of GENERAL MOTORS COMPANY

**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 Plug (Qty: 2) |
| 2 | Transfer Case Fill Plug |
| 3 | Transfer Case Drain Plug |
| 4 | Transfer Case Control Lever Bolt |
| 5 | Transfer Case Control Lever |
| 6 | Transfer Case Shift Lever Washer |
| 7 | Transfer Case Vent<br><br>**NOTE:**<br>**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 Bolt - Model Dependent |

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| Callout | Component Name |
| --- | --- |
| 11 | Vehicle Speed Sensor Assembly - Model Dependent<br><br>**NOTE:**<br>**Refer to NQF / NQG Interim Model Year Design Change - Digital Speed Sensor - RPO AVF in the New Product Information .** |
| 12 | Vehicle Speed Sensor O-ring Seal - Model Dependent |
| 13 | Transfer Case Vibration Dampener Nut - Model Dependent<br><br>**NOTE:**<br>**During nut removal if the stud rotates, use a second tool to retain the stud.** |
| 14 | Transfer Case Vibration Dampener - Model Dependent<br><br>**NOTE:**<br>**Refer to NQH/NQG-LD Model Year Design Change - Addition of a Tuned Vibration Adapter (dampener) for V-6 Engine RPO LV3 Applications in the New Product Information .** |
| 15 | Transfer Case Vibration Dampener Stud - Model Dependent<br><br>**NOTE:** |

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| Callout | Component Name |
|---|---|
| | The location and length of the studs for reassembly. |

**Rear Output Shaft Seal and Bushing Removal**

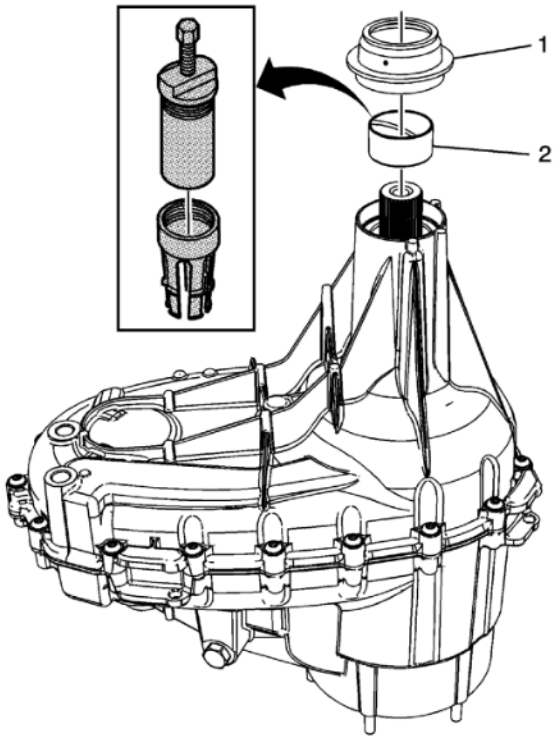



**Fig. 33: View Of Transfer Case Rear Output Shaft Seal & Bushing**
**Courtesy of GENERAL MOTORS COMPANY**

**Rear Output Shaft Seal and Bushing Removal**

| Callout | Component Name |
|---|---|
| 1 | Transfer Case Rear Output Shaft Seal<br><br>**CAUTION:**<br>**Refer to Transfer Case Seal Removal Caution .** |
| 2 | Transfer Case Rear Output Shaft Bushing<br><br>**Procedure**<br><br>1. Only remove the bushing if faulty. Refer to **Transfer Case Rear Half Cleaning and Inspection**.<br>2. The following procedure is for the light duty application, for the heavy duty and super heavy duty applications. Refer to **Rear Output Shaft Bushing Replacement**. |

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| Callout | Component Name |
|---|---|
| | 3. Follow the steps below for use of the **J-45380** remover/installer.<br>4. Install the finger section of the **J-45380** remover/installer in front of the bushing.<br>5. Install the tube and forcing tube assembly into the finger section. Ensure the forcing screw is backed out.<br>6. Using a wrench on the forcing screw, remove the bushing.<br><br>**Special Tools**<br>**J-45380** Transfer Case Rear Bushing Remover and Installer<br>Equivalent regional tools:**Special Tools** |

**Transfer Case Rear Case Half Removal**

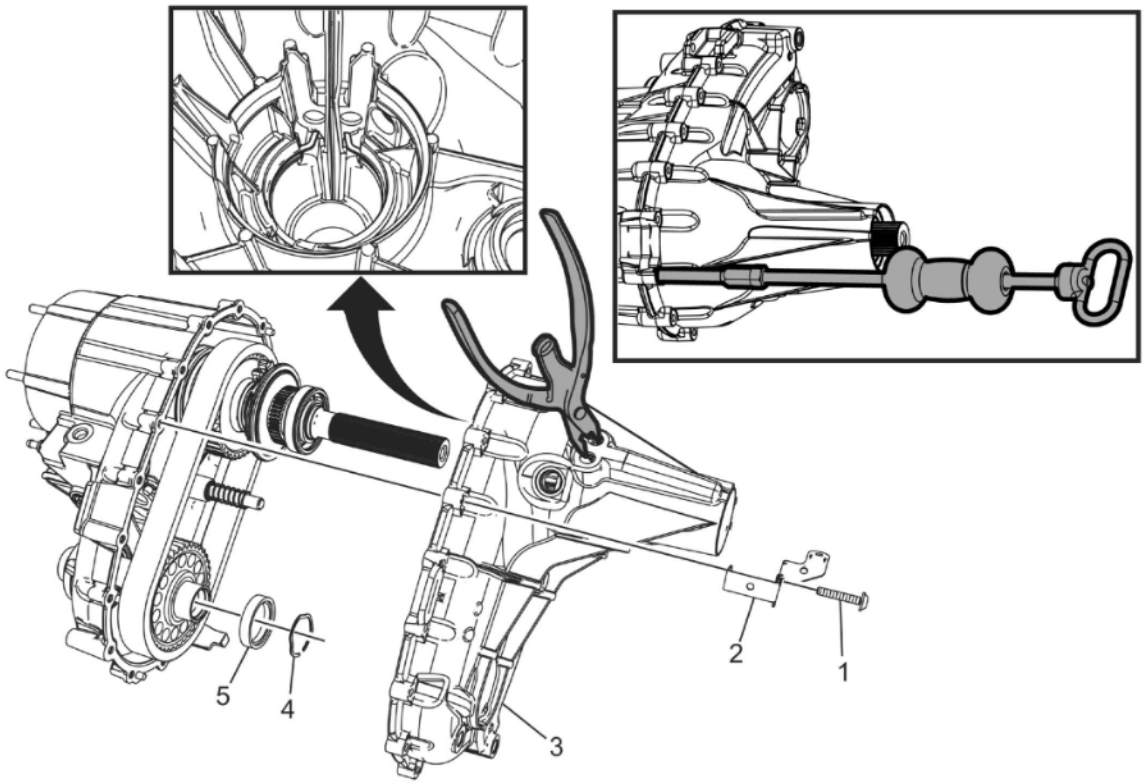



**Fig. 34: NO CONTENT**
**Courtesy of GENERAL MOTORS COMPANY**

**Transfer Case Rear Case Half Removal**

| Callout | Component Name |
|---|---|
| 1 | Transfer Case Bolt [17x] |
| 2 | Transfer Case Bracket |
| 3 | Transfer Case Rear Case Half<br><br>**CAUTION:**<br>**Refer to Machined Surface Damage Caution .** |

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| Callout | Component Name |
|---|---|
| | **Procedure**<br><br>1. Tap the case half bolt hole.<br>2. Tap using a 3/8 x 16 tap. Tap the full length of the case half bolt bore.<br>3. Clean out using air.<br>4. Insert the **DT-51204** into the case half threaded hole.<br>5. Install the **GE-02619-A** to the **DT-51204** .<br>6. Use slide hammer to separate case halves.<br>7. Remove tools.<br>8. 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.<br><br>**New Product Information**<br><br>**Special Tools**<br><br>• **DT-51204** Case Separating Tool<br>• **GE-02619-A** Slide Hammer<br><br>Equivalent regional tools:**Special Tools** |
| 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**

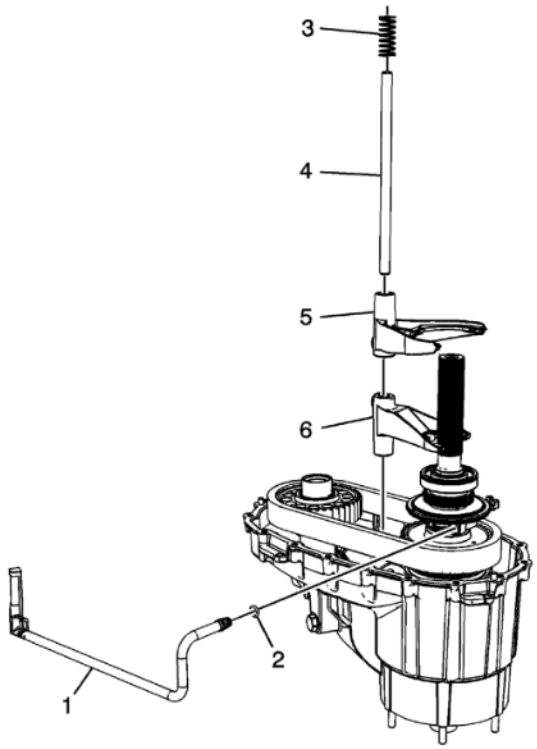



**Fig. 35: Oil Pump Suction Pipe and Shift Forks**
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**Oil Pump Suction Pipe and Shift Forks Removal**

| 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 High/Low Shift Fork Assembly |
| 6 | Transfer Case High/Low Shift Fork<br><br>**NOTE:**<br>**Refer to Interim Model Year Design Change - NQG High/Low Shift Fork, Fork Pad, and High/Low Clutch in New Product Information.** |

**Drive Chain and Rear Output Shaft Assembly Removal**

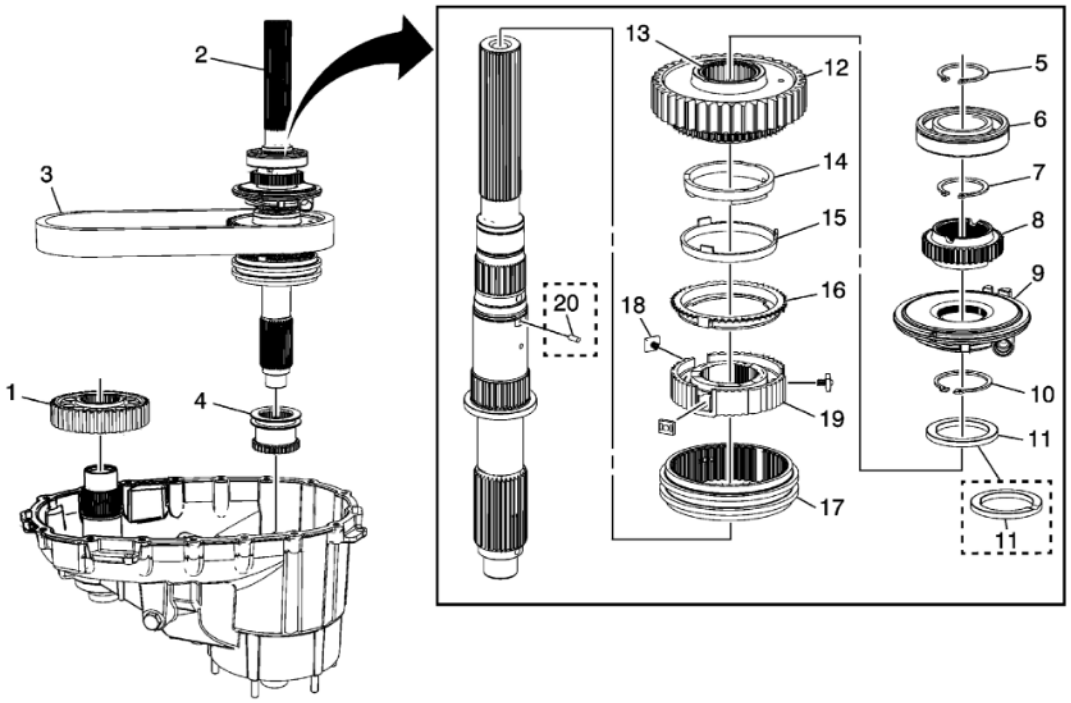



**Fig. 36: Identifying Drive Chain and Rear Output Shaft Components**
**Courtesy of GENERAL MOTORS COMPANY**

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**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<br><br>**NOTE:**<br>**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<br><br>**NOTE:**<br>**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 Driven Sprocket Spacer- Rear<br><br>**NOTE:**<br>**LD spacers have two flat surfaces within the inner area to prevent spacer rotation. HD and SHD spacers have a notched area to align with the spacer pin to prevent** |

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| Callout | Component Name |
|---|---|
| | **spacer rotation.** |
| 12 | Transfer Case Front Output Shaft Drive Sprocket |
| 13 | Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly<br>**Procedure**<br>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 |
| 19 | Transfer Case Two/Four Wheel Drive Synchronizer Hub |
| 20 | Transfer Case Front Output Shaft Drive Sprocket Spacer Pin - HD and SHD Only<br>**NOTE:**<br>**Refer to Interim Model Year Design Change - NQF/NQG HD and SHD Design Change - Main Shaft, pin, and thrust washer in New Product Information.** |

**Input Shaft Oil Seal Removal**

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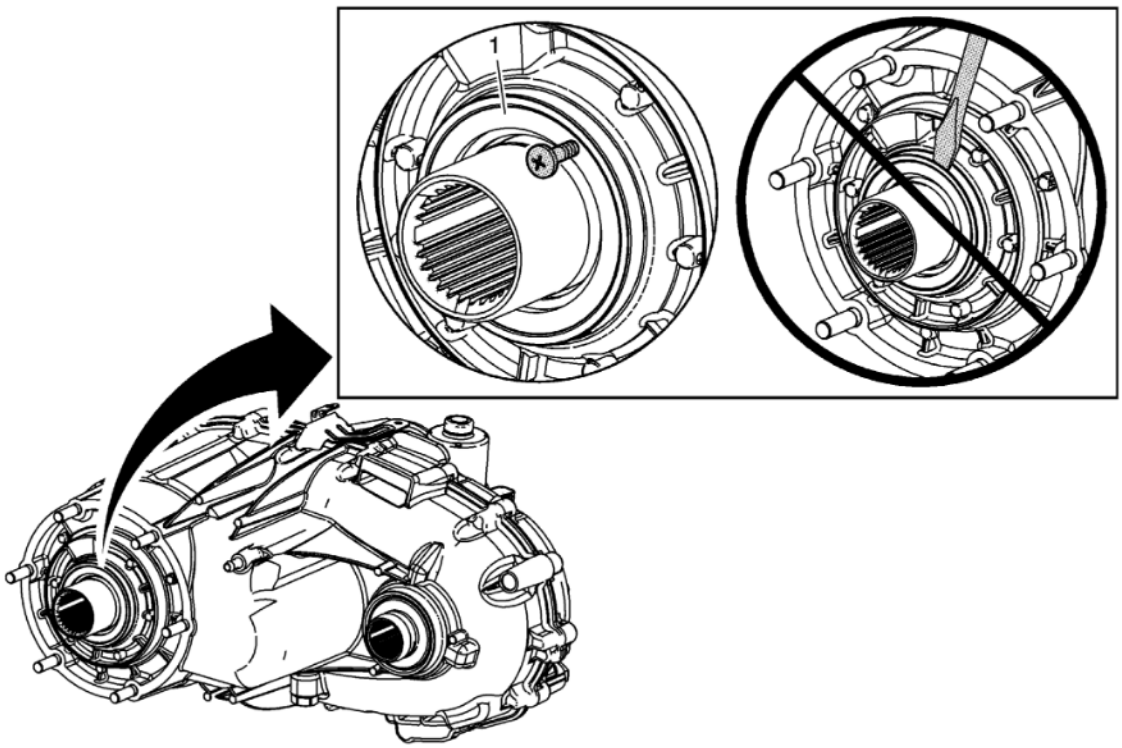



**Fig. 37: Illustrating Proper Input Shaft Oil Seal Installation**
**Courtesy of GENERAL MOTORS COMPANY**

**Input Shaft Oil Seal Removal**

| Callout | Component Name |
|---|---|
| 1 | Input Shaft Oil Seal<br><br>**CAUTION:**<br>**Refer to Machined Surface Damage Caution .**<br><br>**Procedure**<br><br>1. Drill a pilot hole, as required, and insert a self-tapping screw into the body of the seal.<br>2. Use a plier or slide hammer type tool to remove the seal from the bore. |

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

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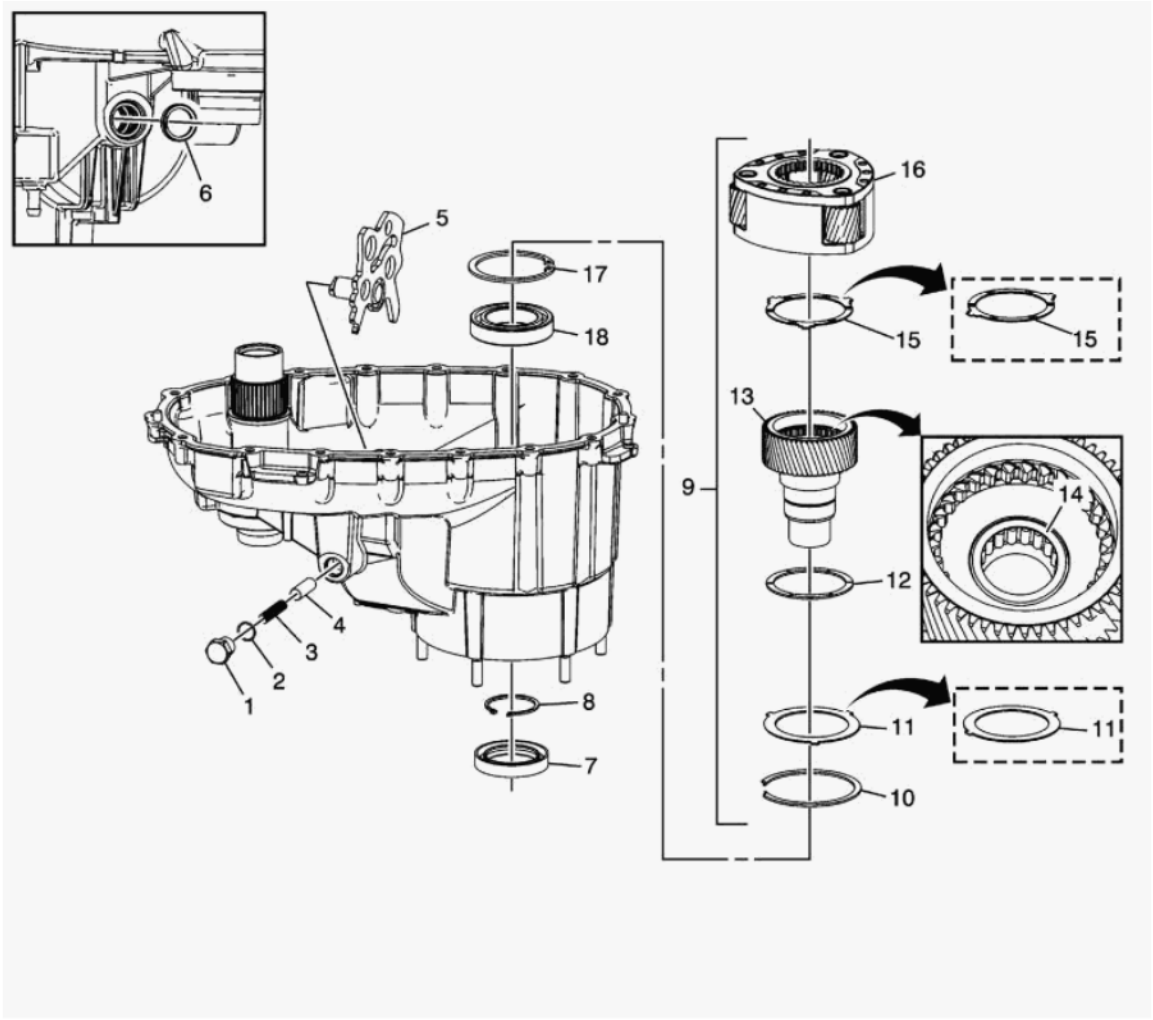



Fig. 38: Shift Detent Plunger Assembly, Shift Detent Lever, Input Shaft and Planetary Assembly
Courtesy of GENERAL MOTORS COMPANY

**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<br><br>**WARNING:**<br>**Do not rotate the transfer case and holding fixture with the retaining ring removed.** |

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| Callout | Component Name |
| --- | --- |
| | **Rotating may cause the input shaft/planetary assembly to fall from the transfer case, resulting in personal injury.** |
| 9 | Transfer Case Input Shaft/Planetary Assembly<br><br>**NOTE:**<br>**Refer to Interim Model Year Design Change - NQF/NQG/NQH Front Case Half Assembly, Input Shaft, Planetary Carrier High/Low Clutch in New Product Information.** |
| 10 | Transfer Case High/Low Planetary Carrier Retaining Ring |
| 11 | Transfer Case High/Low Locking Plate-Model Dependent |
| 12 | Transfer Case Planetary Carrier Sun Gear Thrust Washer |
| 13 | Transfer Case Input Shaft |
| 14 | Transfer Case Input Shaft Pilot Bearing Assembly<br>**Procedure**<br>Refer to **Front Output Shaft and Input Shaft Cleaning and Inspection**.<br><br>**NOTE:**<br>**Only remove the bearing if faulty.** |
| 15 | Transfer Case Planetary Carrier Sun Gear Thrust Washer-Model Dependent |
| 16 | Transfer Case High/Low Planetary Carrier Assembly-Model Dependent |
| 17 | Transfer Case Input Shaft Inner Retaining Ring |
| 18 | Transfer Case Input Shaft Bearing Assembly |

**Front Output Shaft Assembly Removal**

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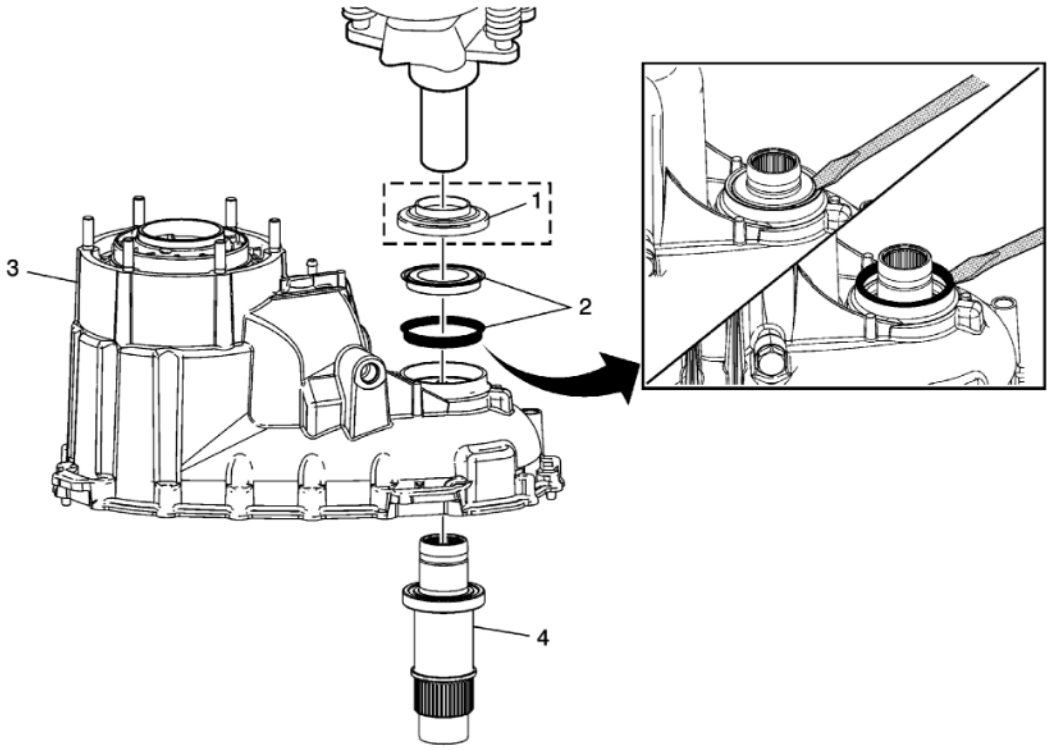



**Fig. 39: Identifying Front Output Shaft Components**
**Courtesy of GENERAL MOTORS COMPANY**

**Front Output Shaft Assembly Removal**

| Callout | Component Name |
|---|---|
| 1 | Transfer Case Front Output Flange Oil Slinger- Model Dependent<br><br>**NOTE:**<br>**Refer to Interim Model Year Design Change - NQF/NQG /NQH/NPO Front Output Shaft, Deflector, and Seal in New Product Information.** |
| 2 | Transfer Case Front Output Shaft Seal<br><br>**Procedure**<br><br>1. Remove the front output shaft seal in two pieces using the following procedure.<br>2. Insert a screwdriver between the metal inner and metal outer portions of the seal.<br>3. Pry upward in multiple locations working the metal inner portion of the seal off the shaft until removed.<br>4. Once the inner metal portion is removed, insert a screwdriver between the outer diameter |

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| Callout | Component Name |
|---|---|
| | metal flange of the seal and the housing.<br>5. Drive the screwdriver inward in multiple locations, the outer portion of the seal will be distorted and can easily be removed from the housing. |
| 3 | Transfer Case Front Case Half<br>**NOTE:**<br>**Place the front case half on an arbor press.** |
| 4 | Transfer Case Front Output Shaft Assembly<br>**NOTE:**<br>**Press the front output shaft assembly from the front case half using an arbor press or soft-face hammer.** |

## TRANSFER CASE FRONT HALF CLEANING AND INSPECTION

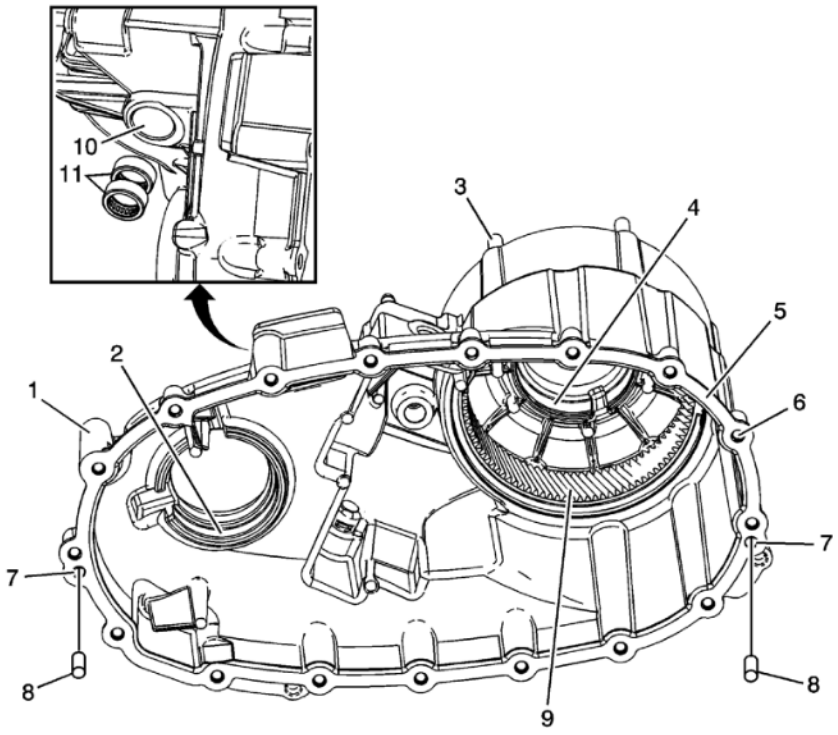



**Fig. 40: View Of Transfer Case Front Half Inspection Points**
**Courtesy of GENERAL MOTORS COMPANY**

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| Callout | Component Name |
| --- | --- |
| **CAUTION:**<br>**Refer to Machined Surface Damage Caution .**<br><br>**Preliminary Procedure**<br><br>1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.<br>2. Clean the front case half in cleaning solvent and air dry.<br>3. Remove any sealant from the sealing surface. | |
| 1 | Transfer Case Front Half Assembly<br><br>**NOTE:**<br>**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<br><br>**NOTE:**<br>**Replace the front case half assembly if a bearing has spun or if cracks are detected.** |
| 3 | Transfer Case Studs (Light Duty Qty: 6) (Heavy Duty Qty: 5)<br><br>**NOTE:**<br>**Replace any damaged studs.** |
| 4 | Transfer Case Input Shaft Bearing Bore<br><br>**NOTE:** |

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| Callout | Component Name |
| --- | --- |
| | **Replace the front case half assembly if a bearing has spun or if cracks are detected.** |
| 5 | Case Sealing Surface<br><br>**NOTE:**<br>**Repair small scratches or nicks with a soft stone.** |
| 6 | Transfer Case Thread Bolt Holes<br><br>**NOTE:**<br>**Repair any damaged threads.** |
| 7 | Transfer Case Locating Pin Holes<br><br>**NOTE:**<br>**Replace the front half case assembly if the locating pin holes are out of round or damaged.** |
| 8 | Transfer Case Locating Pins (Qty: 2)<br><br>**NOTE:**<br>**Repair or replace loose, missing, or damaged locating pins.** |
| 9 | Transfer Case High/Low Internal Gear<br><br>**NOTE:**<br>**Replace the front case half assembly if** |

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| Callout | Component Name |
| --- | --- |
| | **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<br><br>**NOTE:**<br>**Replace the front case half assembly if a bearing has spun or if cracks are detected.** |
| 11 | Transfer Case Shift Detent Lever Bearing Assembly<br>**Procedure**<br>Replace the bearings if roughness, brinelling, or pitting is detected. Refer to **Shift Detent Lever Bearing Replacement**. |

## TRANSFER CASE REAR HALF CLEANING AND INSPECTION

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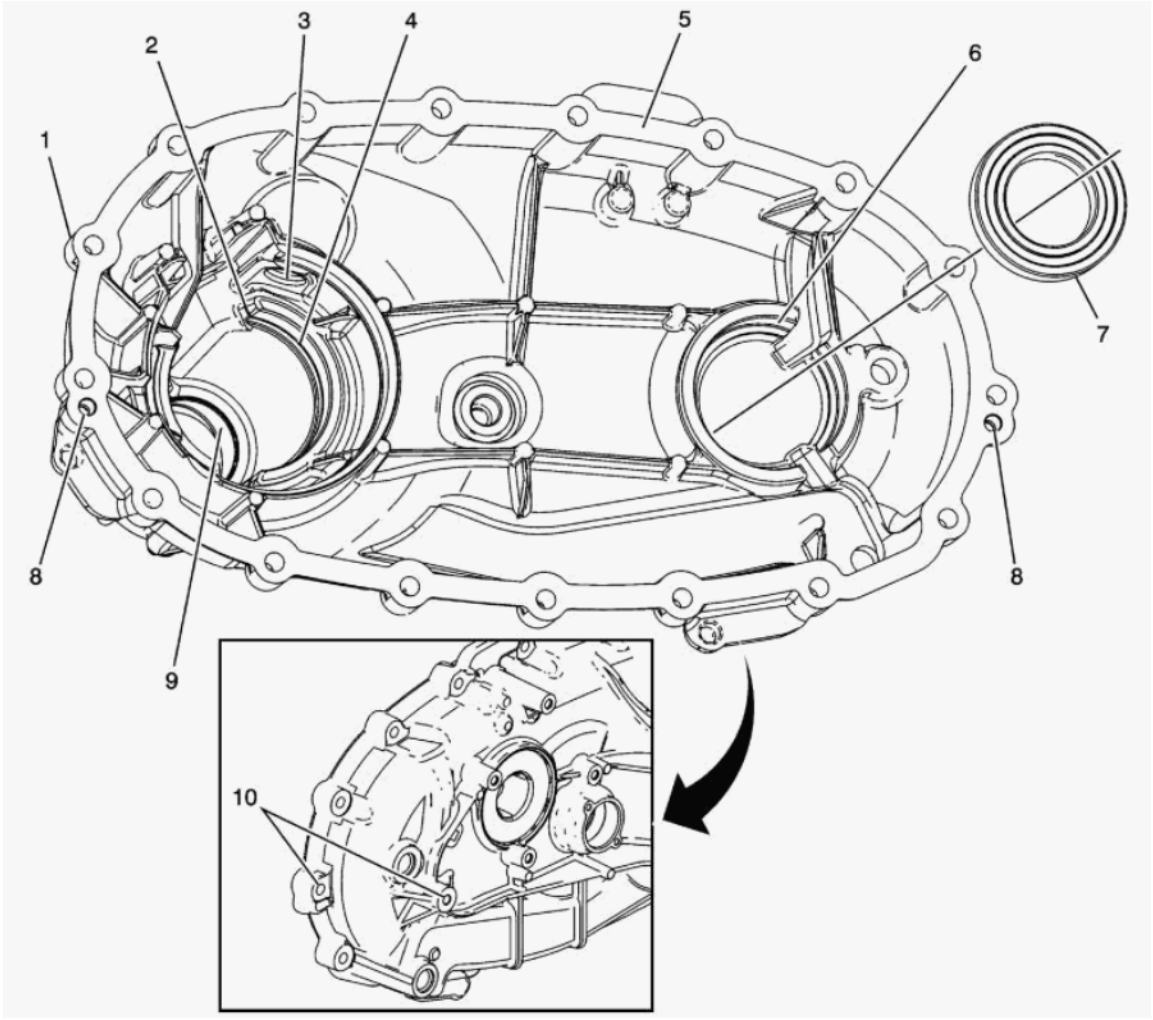



Fig. 41: Transfer Case Rear Half
Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name |
|---|---|
| **CAUTION:** Refer to Machined Surface Damage Caution .<br><br>**Preliminary Procedure**<br>1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.<br>2. Clean the rear case half in cleaning solvent and air dry.<br>3. Remove any sealant from the sealing surface. | |
| 1 | Transfer Case Rear Half Assembly<br><br>**NOTE:** |

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| Callout | Component Name |
| --- | --- |
| | **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<br><br>**NOTE:**<br>**Replace the rear case half assembly if the groove is worn.** |
| 3 | Vehicle Speed Sensor Threads<br><br>**NOTE:**<br>**Replace the rear case half assembly if the speed sensor threads are damaged.** |
| 4 | Transfer Case Rear Output Shaft Rear Bearing Bore<br><br>**NOTE:**<br>**Replace the rear case half assembly if a bearing has spun or if cracks are detected.** |
| 5 | Case Sealing Surface<br><br>**NOTE:**<br>**Repair small scratches or nicks with a soft stone.** |

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| Callout | Component Name |
| --- | --- |
| 6 | Transfer Case Front Output Shaft Rear Bearing Bore<br><br>**NOTE:**<br>**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<br>**Procedure**<br>Replace the bearing if roughness, brinelling, or pitting is detected. Refer to **Front Output Shaft Rear Bearing Replacement**. |
| 8 | Transfer Case Locating Pin Holes<br><br>**NOTE:**<br>**Replace the rear case half assembly if the locating pin holes are out of round or damaged.** |
| 9 | Transfer Case Rear Output Shaft Bushing<br><br>**Procedure**<br><br>1. If the bushing is removed, inspect the bushing bore for signs of spinning. Replace the rear case half assembly if the bushing has spun.<br>2. For light duty (LD) vehicles, refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**.<br>3. For heavy duty (HD) and super heavy duty (SHD) vehicles, refer to **Rear Output Shaft Bushing Replacement**.<br><br>**NOTE:**<br>**Replace the bushing if it is damaged or worn.** |
| 10 | Vibration Dampener Bolt Holes<br><br>**NOTE:**<br>**Replace the rear case half assembly if** |

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| Callout | Component Name |
|---|---|
| | the vibration dampener threads are damaged. |

## OIL PUMP CLEANING AND INSPECTION

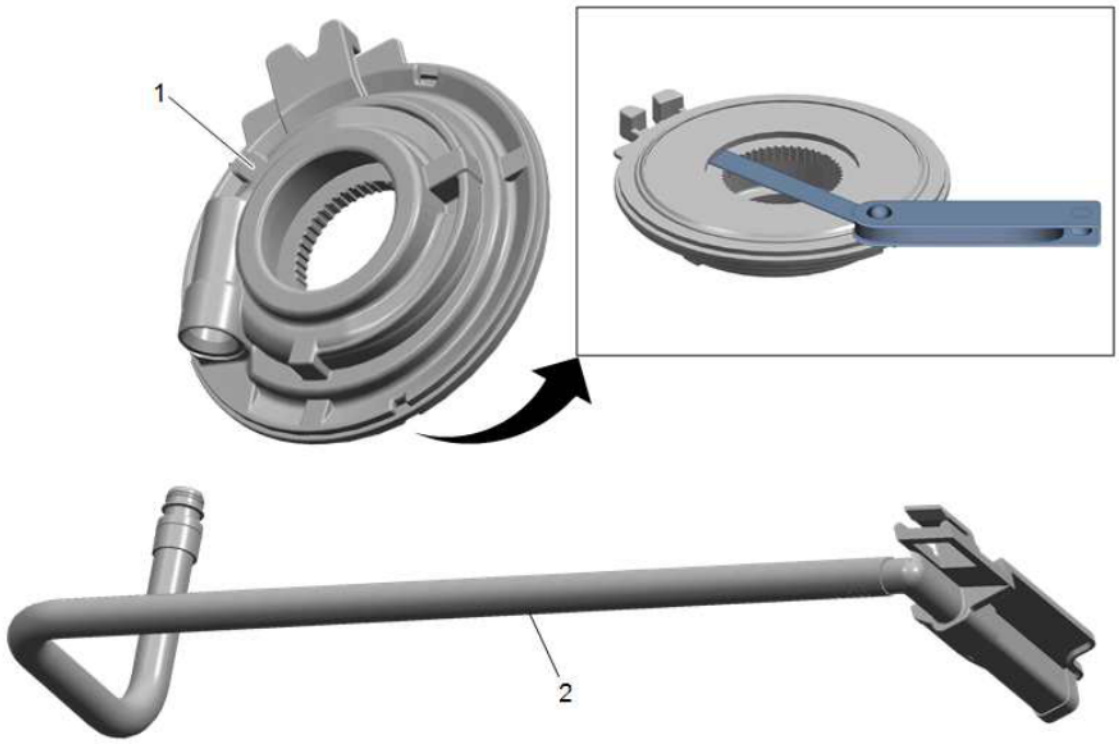



Fig. 42: View Of Transfer Case Oil Pump Assembly & Suction Pipe
Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.<br>2. Clean all components in cleaning solvent and air dry. | |
| 1 | Transfer Case Oil Pump Assembly<br>**NOTE:**<br>**Replace the oil pump assembly if end play is evident or if there is any sign of binding. End** |

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| Callout | Component Name |
| --- | --- |
| | play can be measured by inserting a feeler gauge between the outer rotor and housing. If the end play is greater than 0.1 mm (0.004 in), replace the oil pump assembly. Do not disassemble the oil pump. The oil pump is serviced as an assembly. |
| 2 | Transfer Case Oil Pump Suction Pipe<br><br>**NOTE:**<br>Replace the oil pump suction pipe if the screen is embedded with debris. |

## REAR OUTPUT SHAFT CLEANING AND INSPECTION

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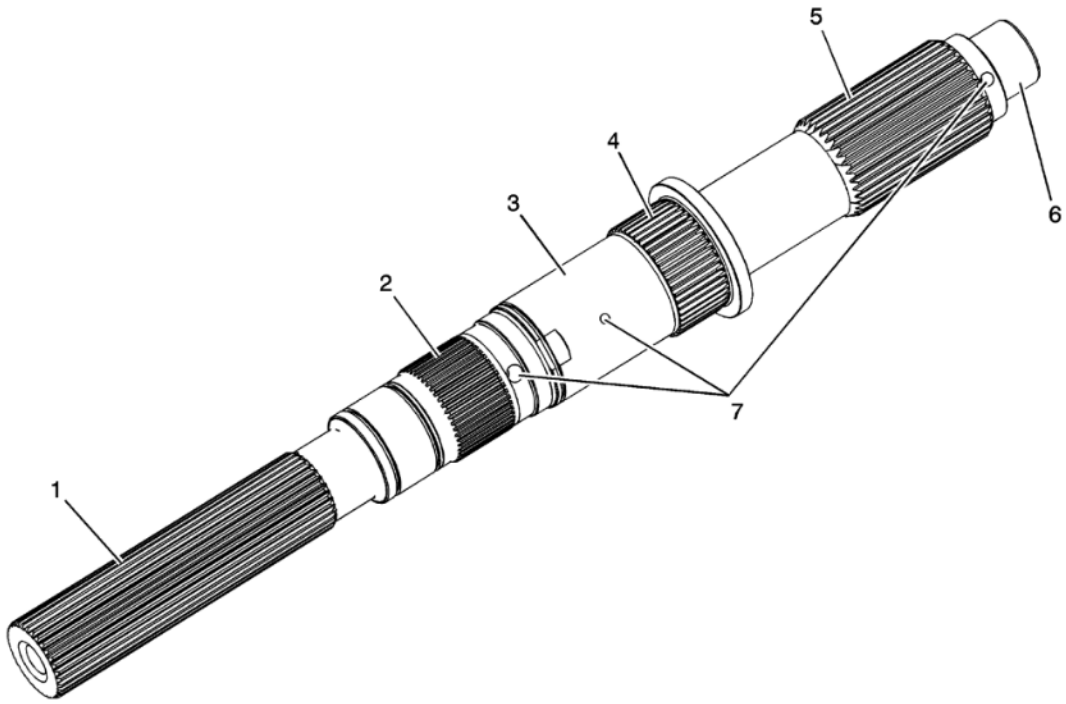



**Fig. 43: View Of Output Shaft Inspection Points**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.<br>2. Clean all components in cleaning solvent and air dry. | |
| 1 | Transfer Case Rear Output Shaft Splines<br>**NOTE:**<br>**Witness marks at the location of the yoke are normal.** |
| 2 | Transfer Case Oil Pump and Rear Output Shaft Speed Reluctor Wheel Engagement Splines<br>**NOTE:**<br>**Witness marks at the location of the components are normal.** |
| 3 | Transfer Case Front Output Shaft Drive Sprocket Bearing Surface<br>**NOTE:** |

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

## FRONT OUTPUT SHAFT AND INPUT SHAFT CLEANING AND INSPECTION

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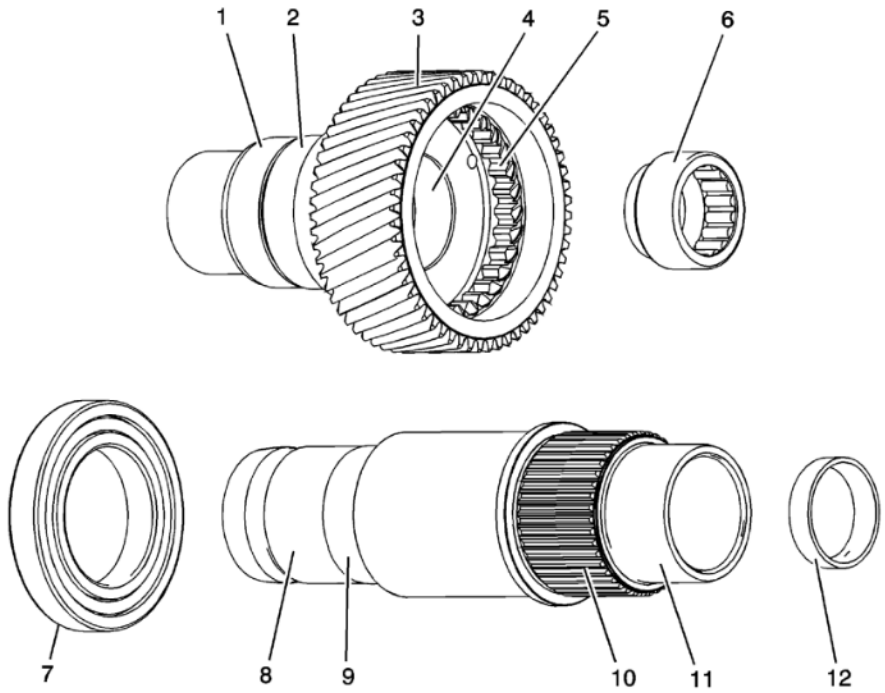



**Fig. 44: View Of Front Output Shaft & Input Shaft Inspection Points**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.<br>2. Clean all components in cleaning solvent and air dry. | |
| 1 | Transfer Case Input Shaft Seal Surface<br>**NOTE:**<br>**Inspect for pitting, excessive wear, or damage.** |
| 2 | Transfer Case Input Shaft Bearing Surface<br>**NOTE:**<br>**Inspect for excessive wear, damage, or if the bearing has spun on the shaft.** |

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| Callout | Component Name |
| --- | --- |
| 3 | Transfer Case Input Shaft Planetary Teeth<br><br>**NOTE:**<br>**Inspect for broken, damaged, or debris embedded in the root of the teeth.** |
| 4 | Transfer Case Input Shaft Pilot Bearing Surface<br><br>**NOTE:**<br>**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<br><br>**NOTE:**<br>**Inspect the engagement teeth for chips or excessive wear.** |
| 6 | Transfer Case Input Shaft Pilot Bearing Assembly<br>**Procedure**<br>Replace the bearing if roughness, brinelling, or pitting is detected. Refer to **Input Shaft Pilot Bearing Replacement (Light Duty)Input Shaft Pilot Bearing Replacement (M30, MYC, MYD)**. |
| 7 | Transfer Case Front Output Shaft Front Bearing Assembly<br>**Procedure**<br>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<br><br>**NOTE:**<br>**Inspect for pitting, excessive wear, or damage.** |

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| Callout | Component Name |
|---|---|
| 9 | Transfer Case Front Output Shaft Front Bearing Surface<br><br>**NOTE:**<br>**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<br><br>**NOTE:**<br>**Witness marks at the location of the sprocket is normal.** |
| 11 | Transfer Case Front Output Shaft Rear Bearing Surface<br><br>**NOTE:**<br>**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<br>**Procedure**<br>Replace the plug, if removed. Refer to **Front Output Shaft Front Bearing Replacement**. |

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

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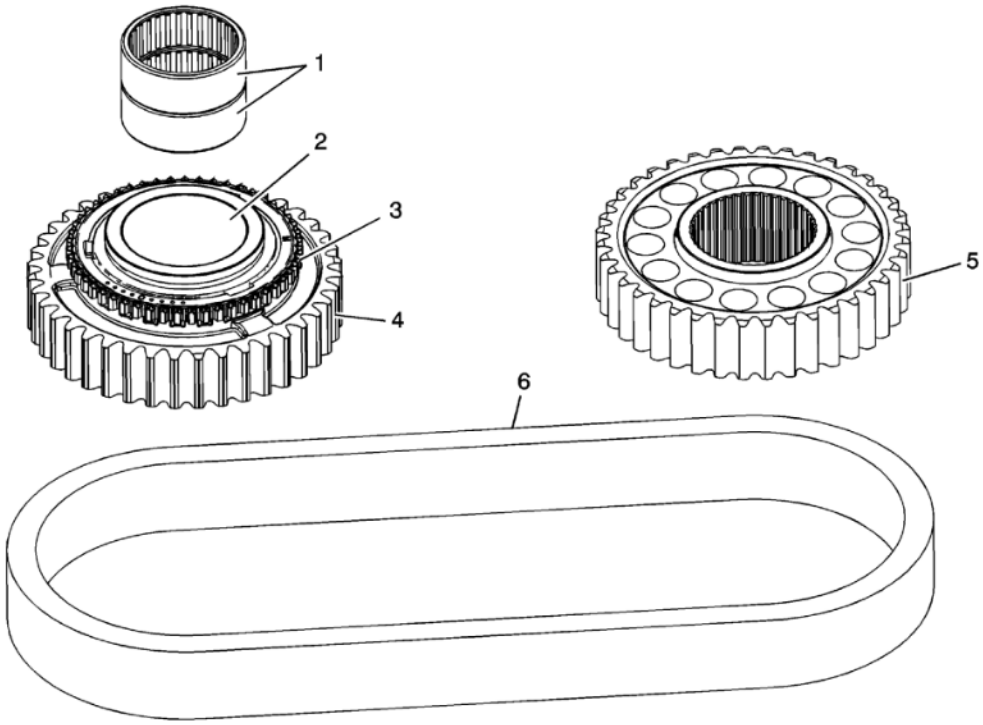



**Fig. 45: View Of Drive Chain, Drive Sprocket, & Driven Sprocket Inspection Points**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.<br>2. Replace any components if damage is found in this procedure. The sprockets must be replaced as a pair.<br>3. Clean all components in cleaning solvent and air dry. | |
| 1 | Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly<br>**Procedure**<br>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<br>**NOTE:**<br>**If the bearing is removed, inspect for excessive wear, damage, or if the bearing has spun in the bore.** |

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| Callout | Component Name |
| --- | --- |
| 3 | Transfer Case Two/Four Wheel Drive Synchronizer Sleeve Engagement Teeth<br><br>**NOTE:**<br>**Inspect the engagement teeth for chips or excessive wear.** |
| 4 | Transfer Case Front Output Shaft Drive Sprocket<br><br>**NOTE:**<br>• **Inspect for chipped teeth, excessively worn gear surfaces, and debris embedded in the root of the teeth.**<br>• **Witness marks at the location of the chain is normal.** |
| 5 | Transfer Case Front Output Shaft Driven Sprocket<br><br>**NOTE:**<br>• **Inspect for chipped teeth, excessively worn gear surfaces, and debris embedded in the root of the teeth.**<br>• **Witness marks at the location of the chain is** |

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| Callout | Component Name |
|---|---|
| | normal. |
| 6 | Transfer Case Front Output Shaft Drive Chain Assembly<br><br>**NOTE:**<br>**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

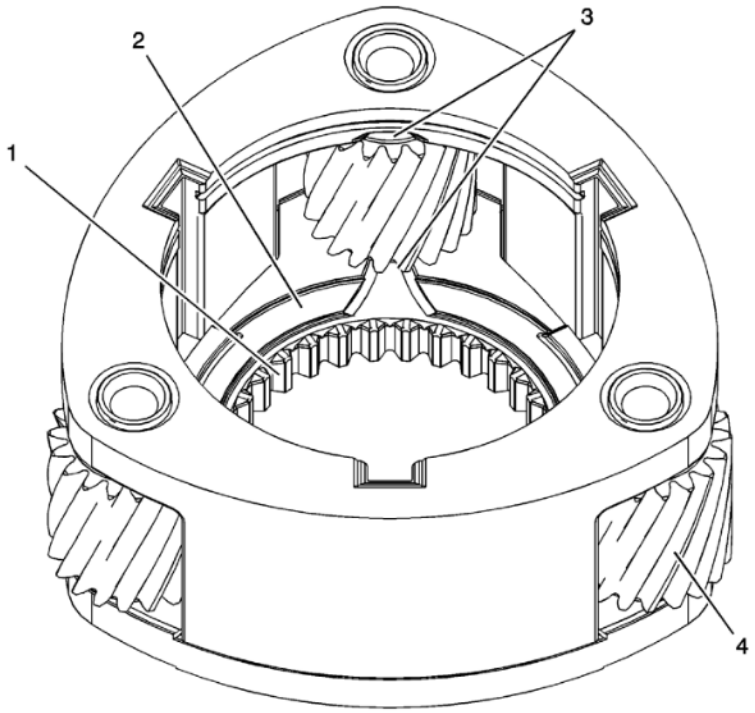



Fig. 46: View Of High/Low Planetary Carrier Inspection Points
Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br><br>1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.<br>2. Clean all components in cleaning solvent and air dry. Do not spin the planetary gears with compressed air.<br>3. The high/low planetary carrier is only serviced as an assembly. | |

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

## HIGH/LOW SHIFT COMPONENTS CLEANING AND INSPECTION

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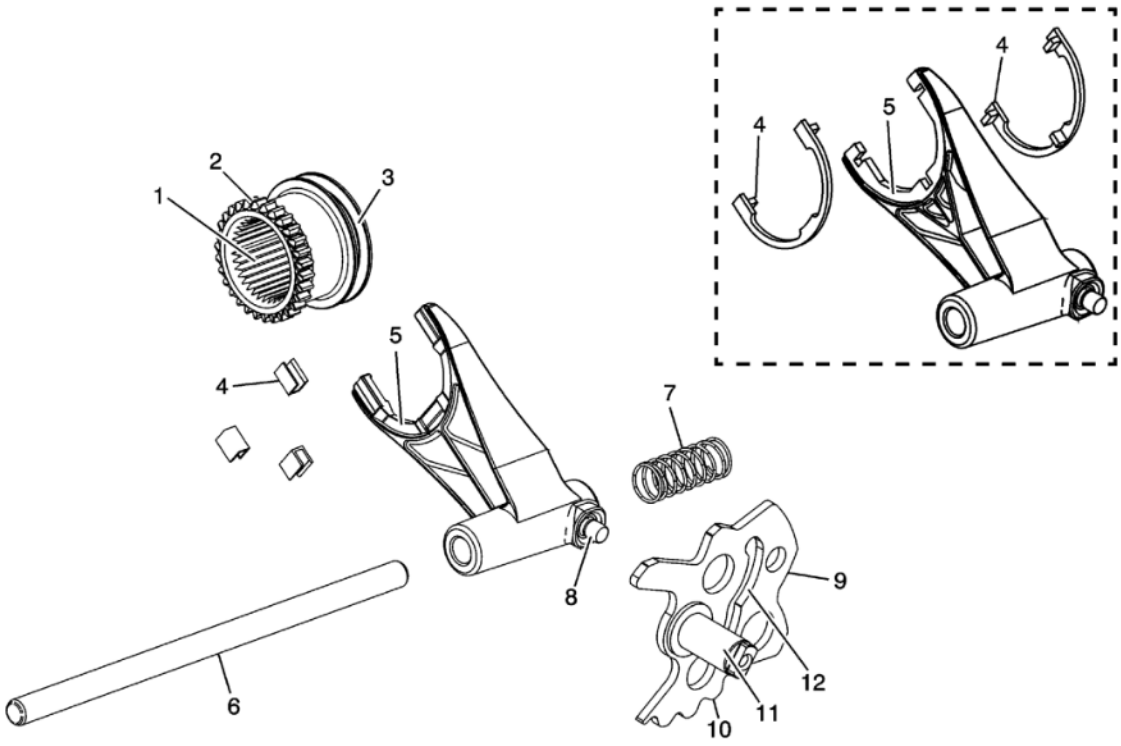



**Fig. 47: View Of High/Low Shift Components Inspection Points**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.<br>2. Clean all components in cleaning solvent and air dry.<br>3. Interim Model Year Change- NQG High/Low Shift Fork, Fork Pads, and High/Low Clutch in **New Product Information**. | |
| 1 | Transfer Case High/Low Clutch Inner Splines<br>**NOTE:**<br>**Inspect the inner splines for excessive looseness on the rear output shaft.** |
| 2 | Transfer Case High/Low Clutch Teeth<br>**NOTE:**<br>**Inspect the engagement teeth for chips or excessive** |

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| Callout | Component Name |
| --- | --- |
| | **wear.** |
| 3 | Transfer Case High/Low Shift Fork Collar<br><br>**NOTE:**<br>**Inspect the shift fork collar for wear.** |
| 4 | Transfer Case High/Low Shift Fork Pads-Model Dependant<br><br>**NOTE:**<br>**Inspect the pads for wear.** |
| 5 | Transfer Case High/Low Shift Fork-Model Dependant<br><br>**NOTE:**<br>• **Inspect for cracks, broken areas, or other damage. The component must be replaced if damage is found. The second design fork and pad are the only design available for service. The second design High/Low clutch must be used with the second design fork.**<br>• **Interim Model Year Change- NQG High/Low** |

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| Callout | Component Name |
| --- | --- |
| | **Shift Fork, Fork Pads, and High/Low Clutch in New Product Information.** |
| 6 | Transfer Case Control Actuator Shaft<br><br>**NOTE:**<br>**Inspect the shaft for straightness.** |
| 7 | Transfer Case Shift Fork Spring<br><br>**NOTE:**<br>**Inspect the spring for breakage.** |
| 8 | Transfer Case High/Low Shift Fork Pin<br><br>**NOTE:**<br>**Inspect the pin for wear.** |
| 9 | Transfer Case Two/Four Wheel Drive Mode Cam Lobes<br><br>**NOTE:**<br>**Inspect the cam lobes for wear or roughness.** |
| 10 | Transfer Case Shift Detent Plunger Cam Lobes<br><br>**NOTE:**<br>**Inspect the cam lobes for wear or roughness.** |
| 11 | Transfer Case Shift Detent Lever Shaft<br><br>**NOTE:**<br>**Inspect for scoring, brinelling, pitting, or excessive** |

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| Callout | Component Name |
|---|---|
| | **wear.** |
| 12 | Transfer Case High/Low Shift Fork Cam Lobes<br><br>**NOTE:**<br>**Inspect the cam lobes for wear or roughness.** |

## TWO/FOUR WHEEL DRIVE SHIFT COMPONENTS CLEANING AND INSPECTION

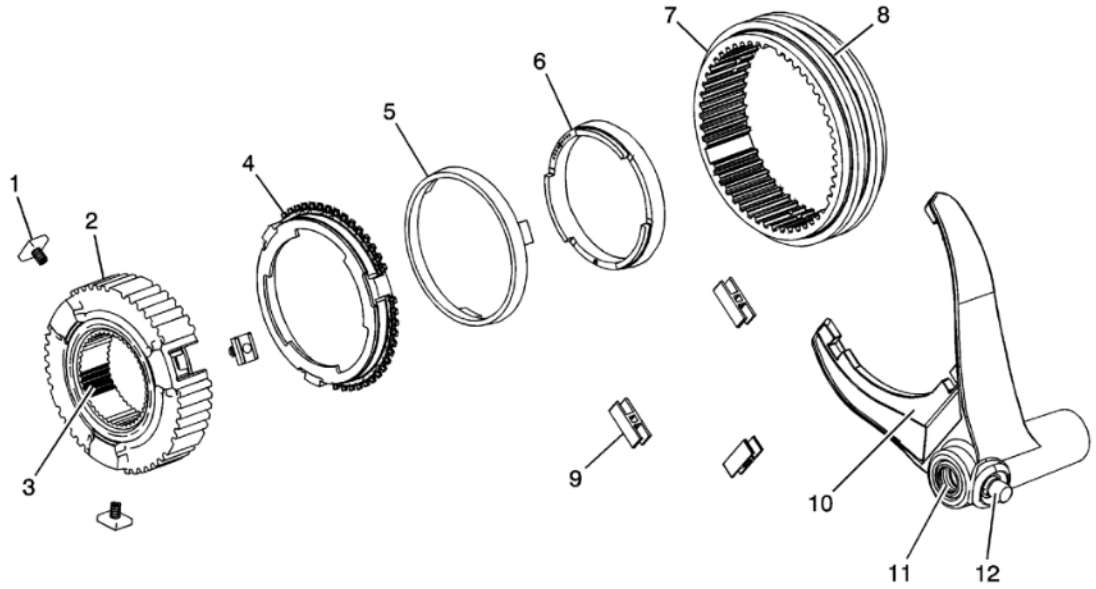



**Fig. 48: View Of Two/Four Wheel Drive Shift Component Inspection Points**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br><br>1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.<br>2. Clean all components in cleaning solvent and air dry. | |
| 1 | Transfer Case Two/Four Wheel Drive Synchronizer Insert<br><br>**NOTE:**<br>**Inspect the inserts for wear.** |

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| Callout | Component Name |
| --- | --- |
| 2 | Transfer Case Two/Four Wheel Drive Synchronizer Hub Engagement Teeth<br><br>**NOTE:**<br>**Inspect the engagement teeth for wear.** |
| 3 | Transfer Case Two/Four Wheel Drive Synchronizer Hub Splines<br><br>**NOTE:**<br>**Inspect the splines for loose fit on the rear output shaft.** |
| 4 | Transfer Case Two/Four Wheel Drive Synchronizer Assembly<br><br>**NOTE:**<br>**Inspect the synchronizer for wear or chipped teeth.** |
| 5 | Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring - Outer<br><br>**NOTE:**<br>**Inspect the synchronizer ring for wear, damage, or missing material.** |
| 6 | Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring - Inner<br><br>**NOTE:**<br>**Inspect the synchronizer ring for wear or roughness.** |
| 7 | Transfer Case Two/Four Wheel Drive Synchronizer Sleeve Engagement Teeth<br><br>**NOTE:**<br>**Inspect the engagement teeth for wear.** |

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| Callout | Component Name |
| --- | --- |
| 8 | Transfer Case Two/Four Wheel Drive Synchronizer Sleeve Collar<br><br>**NOTE:**<br>**Inspect the collar for wear.** |
| 9 | Transfer Case Two/Four Wheel Drive Shift Fork Inserts<br><br>**NOTE:**<br>**Inspect the inserts for wear.** |
| 10 | Transfer Case Two/Four Wheel Drive Shift Fork Assembly<br><br>**NOTE:**<br>**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<br><br>**NOTE:**<br>**Replace the shift fork if roughness or pitting is detected.** |
| 12 | Transfer Case Two/Four Wheel Drive Shift Fork Pin<br><br>**NOTE:**<br>**Replace the shift fork if the pin is worn.** |

## REAR OUTPUT SHAFT BUSHING REPLACEMENT

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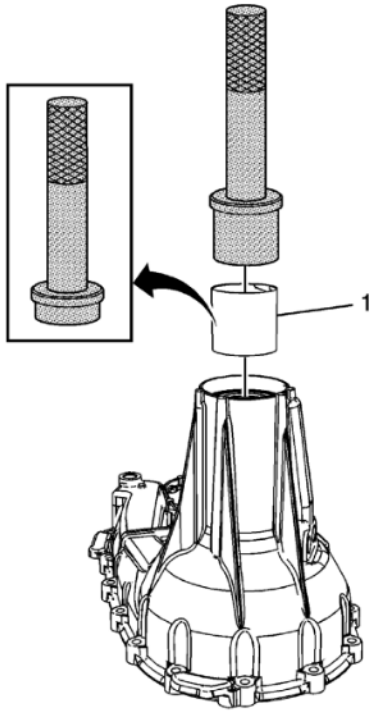



**Fig. 49: View Of Rear Output Shaft Bushing**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>Ensure the bushing is installed squarely into the bushing bore. | |
| 1 | Transfer Case Rear Output Shaft Bushing<br>**Procedure**<br>Press the bushing until the tool bottoms on the rear case half.<br><br>**Special Tools**<br>• **DT-48022** Output Bushing Installer<br>• **DT-48209** Bushing Remover<br>• **GE-8092** Driver Handle<br><br>For equivalent regional tools, refer to **Special Tools**. |

## SHIFT DETENT LEVER BEARING REPLACEMENT

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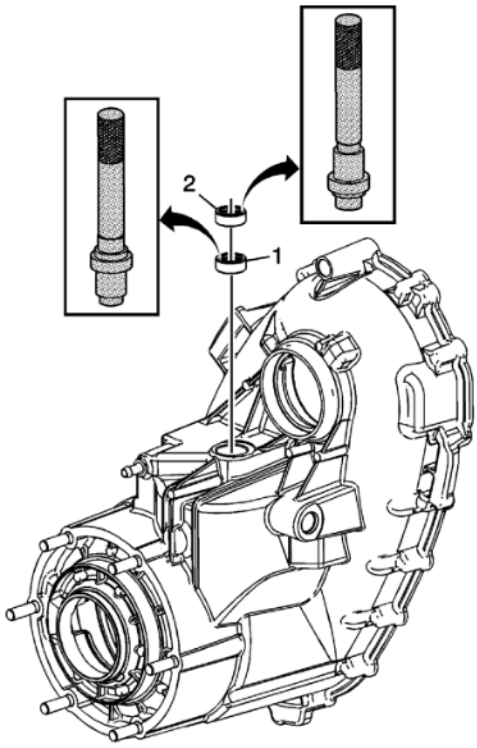



**Fig. 50: View Of Inner & Outer Shift Detent Lever Bearings**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br>1. Using the **J 7079-2** universal driver handle - non-threaded , remove the bearings from the front case half.<br>2. Ensure the bearings are installed squarely into the bearing bores. | |
| 1 | Transfer Case Shift Detent Lever Bearing - Inner<br>**Procedure**<br>1. Ensure the printing on the bearing is facing upward.<br>2. Install the bearing using the long side of the **DT-48215** shift detent lever bearing installer.<br>3. Press the bearing until the tool bottoms on the front case half.<br>**Special Tools**<br>• **DT-48215** Shift Detent Lever Bearing Installer<br>• **J 7079-2** Universal Driver Handle - Non-Threaded<br>For equivalent regional tools, refer to **Special Tools**. |
| 2 | Transfer Case Shift Detent Lever Bearing - Outer<br>**Procedure**<br>1. Ensure the printing on the bearing is facing upward.<br>2. Install the bearing using the long side of the **DT-48215** shift detent lever bearing installer. |

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| Callout | Component Name |
|---|---|
| | 3. Press the bearing until the tool bottoms on the front case half.<br><br>**Special Tools**<br><br>• **DT-48215** Shift Detent Lever Bearing Installer<br>• **J 7079-2** Universal Driver Handle - Non-Threaded |

## INPUT SHAFT PILOT BEARING REPLACEMENT (LIGHT DUTY)

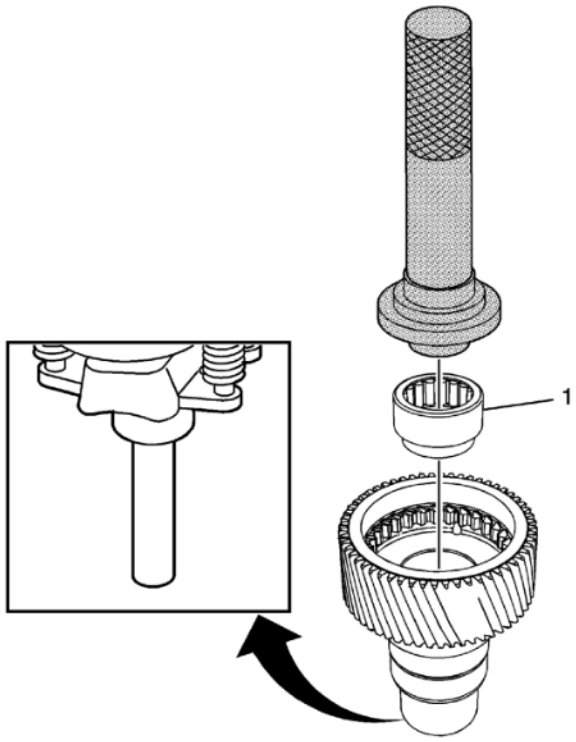



**Fig. 51: View Of Transfer Case Input Shaft Pilot Bearing**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>Ensure the bearing is installed squarely into the input shaft bore. | |
| 1 | Transfer Case Input Shaft Pilot Bearing<br><br>**Procedure**<br><br>1. Using a suitable adapter and an arbor press, remove the input shaft pilot bearing by going through the front of the input gear.<br>2. Install the bearing using the small side of the **DT-48212** bearing installer.<br>3. Press the bearing until the tool bottoms on the input shaft.<br><br>**Special Tools**<br><br>• **DT-48212** Input Shaft Pilot Bearing Installer<br>• **GE-8092** Driver Handle |

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| Callout | Component Name |
|---|---|
| | For equivalent regional tools, refer to **Special Tools**. |

## INPUT SHAFT PILOT BEARING REPLACEMENT (M30, MYC, MYD)

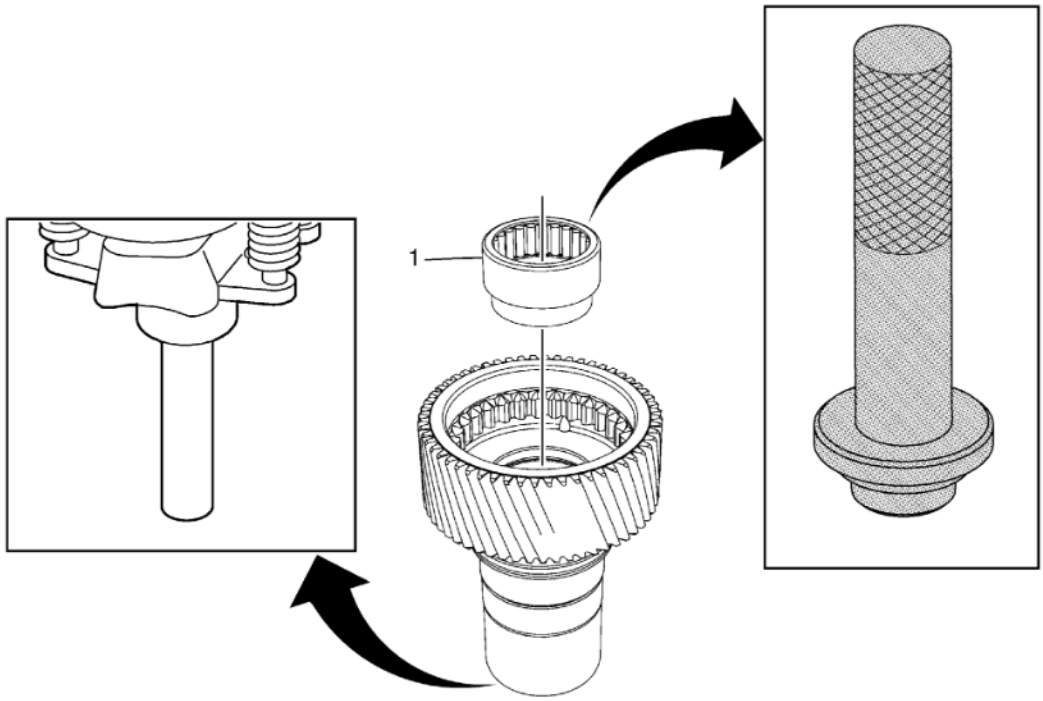



**Fig. 52: Input Shaft Pilot Bearing (M30, MYC, MYD)**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>Ensure the bearing is installed squarely into the input shaft bore. | |
| 1 | Transfer Case Input Shaft Pilot Bearing<br><br>**Procedure**<br><br>1. Using a suitable adapter and an arbor press, remove the input shaft pilot bearing by going through the front of the input gear.<br>2. Install the bearing using the large side of the **DT-49299** input shaft pilot bearing installer.<br>3. Press the bearing until the tool bottoms on the input shaft.<br><br>**Special Tools**<br><br>• **DT-49299** Input Shaft Pilot Bearing Installer<br>• **GE-8092** Driver Handle<br><br>For equivalent regional tools, refer to **Special Tools**. |

## FRONT OUTPUT SHAFT FRONT BEARING REPLACEMENT

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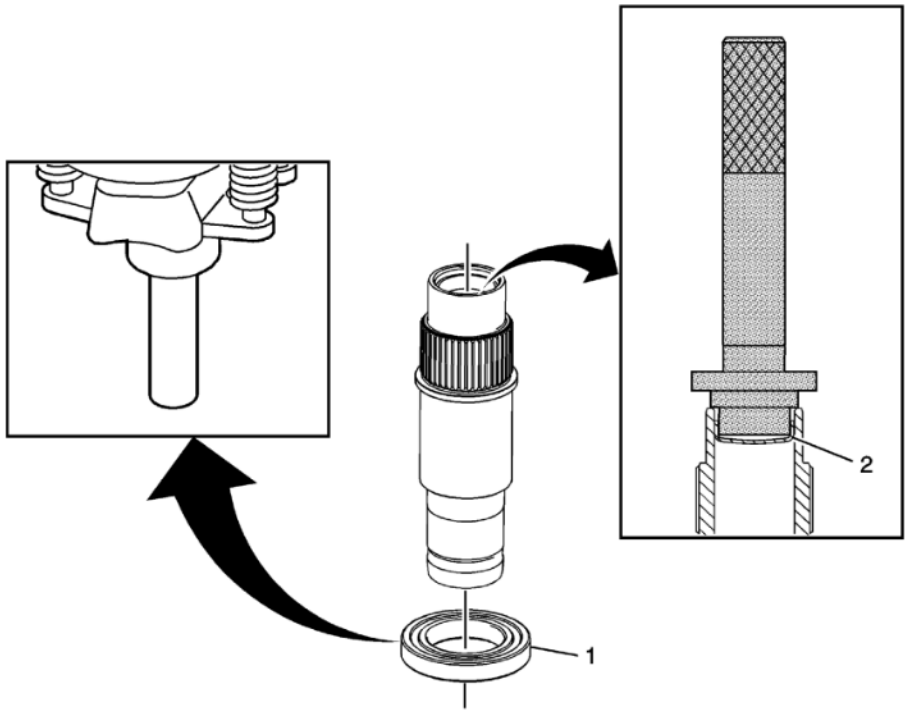



**Fig. 53: View Of Front Output Shaft Front Bearing Assembly, Special Tool & Hole Plug**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>1. Ensure the bearing is installed squarely on the front output shaft.<br>2. 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<br>**NOTE:**<br>**Using a suitable adapter and an arbor press, install the bearing until the bearing bottoms against the spacer.** |
| 2 | Transfer Case Front Output Shaft Hole Plug<br>**Procedure**<br>1. 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.<br>2. Install the plug using the large side of the **DT-48212** bearing installer. |

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| Callout | Component Name |
|---|---|
| | 3. Press the plug until the tool bottoms on the front output shaft.<br><br>**Special Tools**<br><br>• **DT-48212** Input Shaft Pilot Bearing Installer<br>• **GE-8092** Driver Handle<br><br>For equivalent regional tools, refer to **Special Tools**. |

## FRONT OUTPUT SHAFT REAR BEARING REPLACEMENT

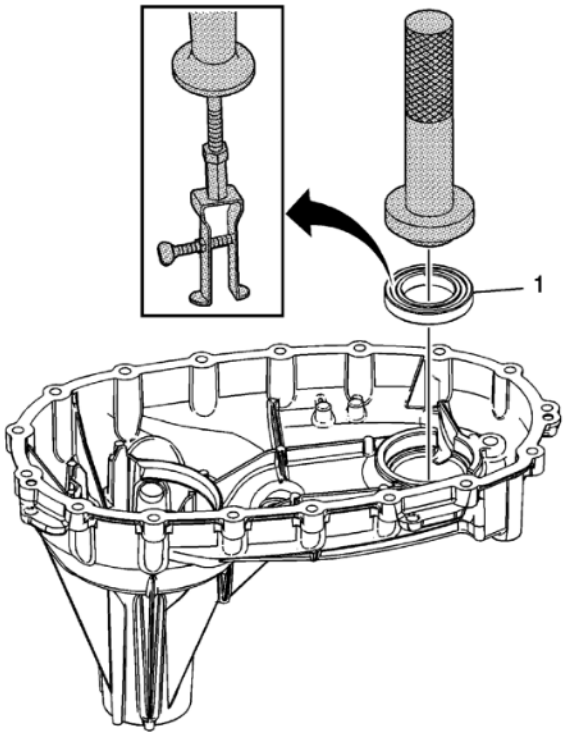



**Fig. 54: View Of Front Output Shaft Rear Bearing Assembly**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br>Ensure the bearing is installed squarely into the bearing bore. | |

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| Callout | Component Name |
|---|---|
| 1 | Transfer Case Front Output Shaft Rear Bearing Assembly<br><br>**Procedure**<br><br>1. A suitable adapter is required to use with the **GE-8092** driver handle to install.<br>2. Press the bearing until the bearing bottoms on the rear case half.<br><br>**Special Tools**<br><br>• **GE-8092** Driver Handle<br>• **J 23907** Slide Hammer with Bearing Adapter<br>• **J 26941** Bushing and Bearing Remover - 3-4 in<br><br>For equivalent regional tools, refer to **Special Tools**. |

## FRONT OUTPUT SHAFT DRIVE SPROCKET BEARING REPLACEMENT

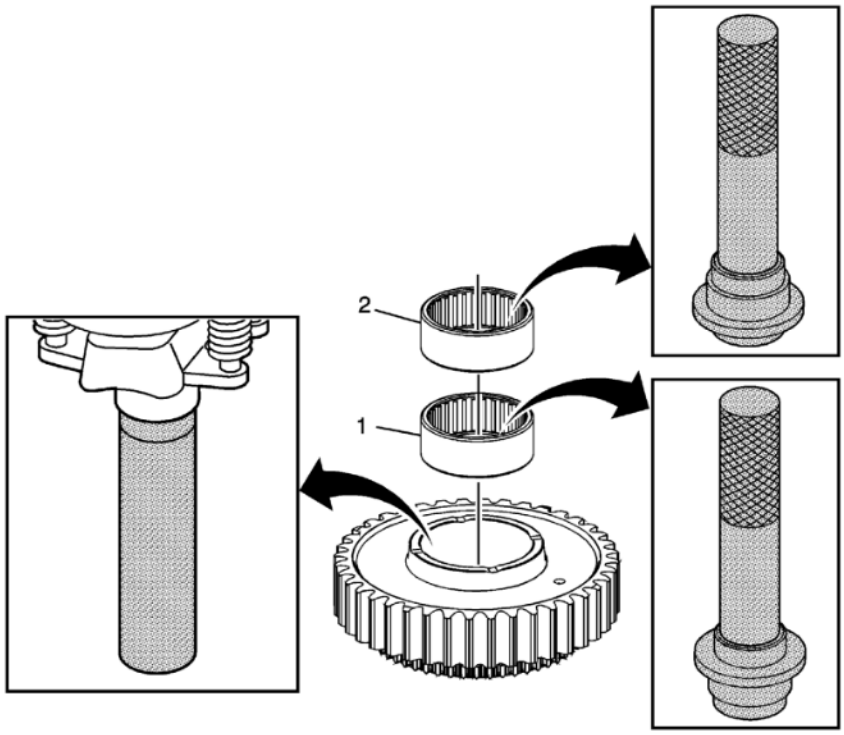



**Fig. 55: View Of Front Output Shaft Drive Sprocket Bearing Assemblies & Special Tools**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| **Preliminary Procedure**<br><br>1. Using the **J 35512** inner pinion bearing installer and an arbor press, remove the bearing assemblies from the drive sprocket.<br>2. Ensure the bearings are installed squarely into the drive sprocket bore.<br>3. Install the bearings from the top with the clutch teeth facing down. | |

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| Callout | Component Name |
| --- | --- |
| 1 | Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly - Front<br><br>**Procedure**<br><br>1. Install the bearing using the long side of the **DT-48211** drive sprocket bearing installer.<br>2. Ensure the flat edge of the bearing is facing upward.<br>3. Using an arbor press or hammer, install the bearing until the tool bottoms on the drive sprocket.<br><br>**Special Tools**<br><br>• **DT-48211** Drive Sprocket Bearing Installer<br>• **GE-8092** Driver Handle<br>• **J 35512** Inner Pinion Bearing Installer<br><br>For equivalent regional tools, refer to **Special Tools**. |
| 2 | Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly - Rear<br><br>**Procedure**<br><br>1. Install the bearing using the short side of the **DT-48211** drive sprocket bearing installer.<br>2. Ensure the flat edge of the bearing is facing upward.<br>3. Using an arbor press or hammer, install the bearing until the tool bottoms on the drive sprocket.<br><br>**Special Tools**<br><br>• **DT-48211** Drive Sprocket Bearing Installer<br>• **GE-8092** Driver Handle<br>• **J 35512** Inner Pinion Bearing Installer |

## TRANSFER CASE ASSEMBLE

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

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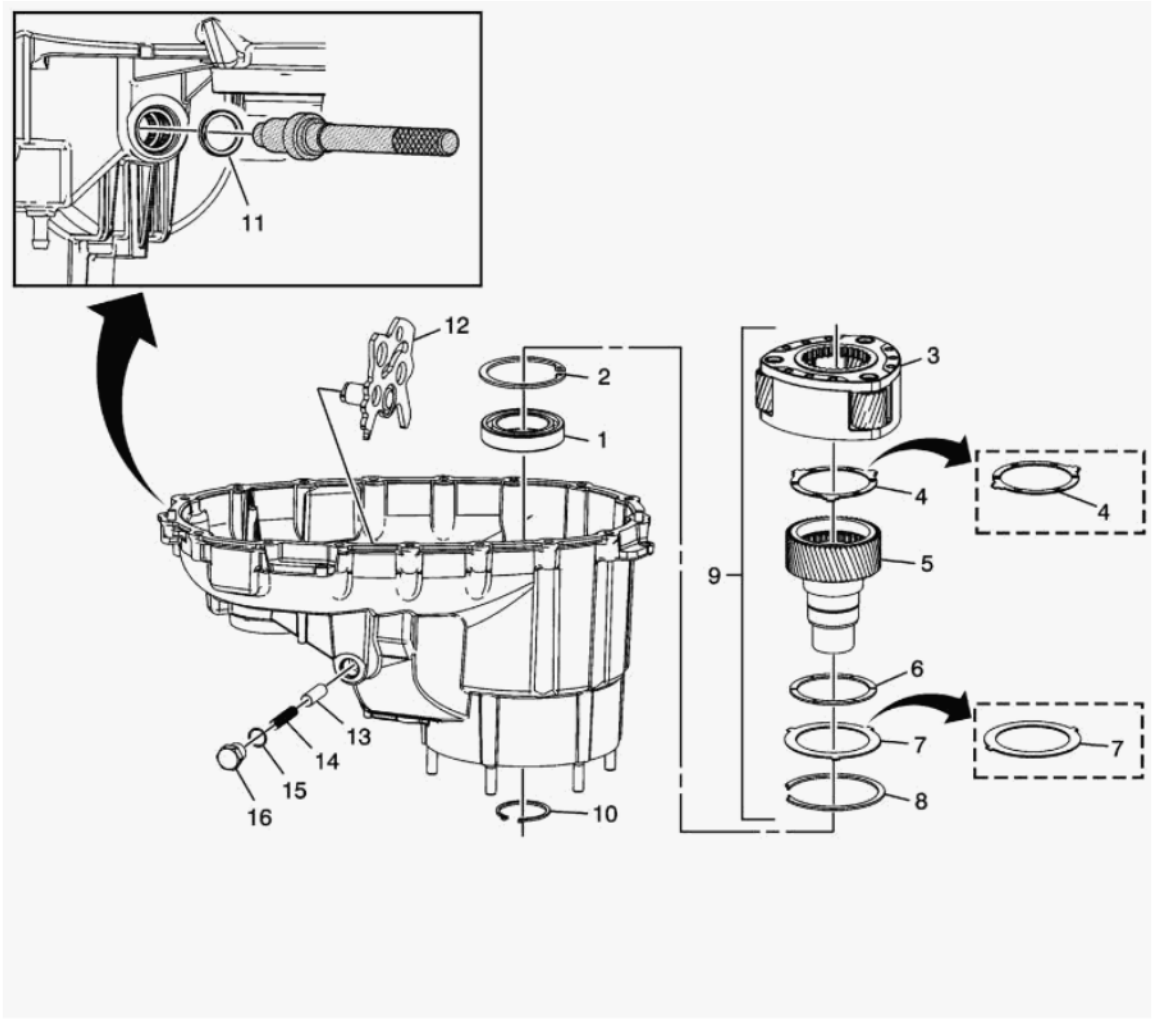



Fig. 56: Shift Detent Plunger Assembly, Shift Detent Lever, Input Shaft and Planetary Assembly
Courtesy of GENERAL MOTORS COMPANY

**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-Model Dependent<br><br>**NOTE:**<br>**Refer to Interim Model Year Design Change - NQF/NQG/NQH Front Case Half Assembly, Input Shaft, Planetary Carrier High/Low Clutch in New Product** |

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| Callout | Component Name |
|---|---|
| | Information. |
| 4 | Transfer Case Planetary Carrier Sun Gear Thrust Washer-Model Dependent |
| 5 | Transfer Case Input Shaft |
| 6 | Transfer Case Planetary Carrier Sun Gear Thrust Washer |
| 7 | Transfer Case High/Low Locking Plate-Model Dependent |
| 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<br>**Procedure**<br>1. Lubricate the seal to ease installation.<br>2. Ensure the lip on the seal is facing inward.<br>3. Ensure the seal is installed squarely into the bore.<br>4. Press the seal in, until it contacts the sector bearing.<br>**Special Tools**<br>• **DT-48215** Shift Detent Lever Bearing Installer<br>• **J-7079-2** Universal Driver Handle - Non-Threaded<br>For equivalent regional tools, refer to 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<br>**Procedure**<br>Lightly lubricate the O-ring with clean DEXRONÂ®VI. |
| 16 | Transfer Case Shift Detent Plunger Plug<br>**CAUTION:**<br>**Refer to Component Fastener Tightening Caution .**<br>**Tighten**<br>20 N.m (15 lb ft) |

**Rear Output Shaft Assembly**

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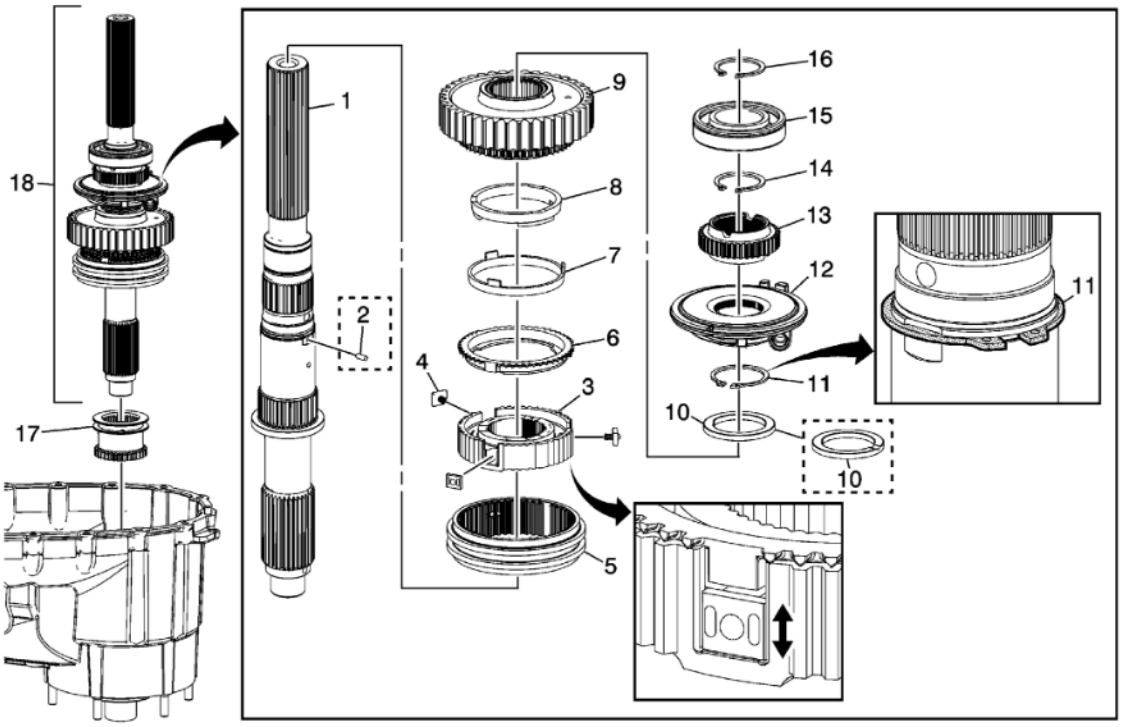



**Fig. 57: Rear Output Shaft**
**Courtesy of GENERAL MOTORS COMPANY**

**Rear Output Shaft Assembly**

| Callout | Component Name |
|---|---|
| 1 | Transfer Case Rear Output Shaft |
| 2 | Transfer Case Front Output Shaft Drive Sprocket Spacer Pin - HD and SHD Only<br><br>**NOTE:**<br>**Refer to Interim Model Year Design Change - NQF/NQG HD and SHD Design Change - Main Shaft, pin, and thrust washer in New Product Information.** |
| 3 | Transfer Case Two/Four Wheel Drive Synchronizer Hub |
| 4 | Transfer Case Two/Four Wheel Drive Synchronizer Insert (Qty: 3)<br><br>**NOTE:** |

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| Callout | Component Name |
| --- | --- |
| | **Ensure that the inserts are installed in the correct orientation in the synchronizer hub. The inserts should be able to move when correctly installed.** |
| 5 | Transfer Case Two/Four Wheel Drive Synchronizer Sleeve |
| 6 | Transfer Case Two/Four Wheel Drive Synchronizer Assembly |
| 7 | Transfer Case Two/Four Wheel Drive Synchronizer Blocking - Outer - Ring |
| 8 | Transfer Case Two/Four Wheel Drive Synchronizer Blocking - Inner - Ring |
| 9 | Transfer Case Front Output Shaft Drive Sprocket |
| 10 | Transfer Case Front Output Shaft Drive Sprocket Spacer - Rear<br><br>**NOTE:**<br>**LD spacers have two flat surfaces within the inner area to prevent spacer rotation. HD and SHD spacers have a notched area to align with the spacer pin to prevent spacer rotation.** |
| 11 | Transfer Case Front Output Shaft Drive Sprocket Retaining Ring<br><br>**NOTE:**<br>**Ensure the retaining ring is installed into the correct retaining** |

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| Callout | Component Name |
| --- | --- |
| | **ring groove on the rear output shaft.** |
| 12 | Transfer Case Oil Pump Assembly |
| 13 | Transfer Case Rear Output Shaft Speed Reluctor Wheel |
| 14 | Transfer Case Rear Output Shaft Rear Bearing Retaining Ring |
| 15 | Transfer Case Rear Output Shaft Rear Bearing Assembly<br>**NOTE:**<br>• **Use an arbor press or a suitable installer to install the bearing to the rear output shaft.**<br>• **Ensure the retaining ring groove in the outer race is positioned toward the rear.** |
| 16 | Transfer Case Rear Output Shaft Rear Bearing Retaining Ring |
| 17 | Transfer Case High/Low Clutch |
| 18 | Transfer Case Rear Output Shaft Assembly |

**Shift Forks Installation**

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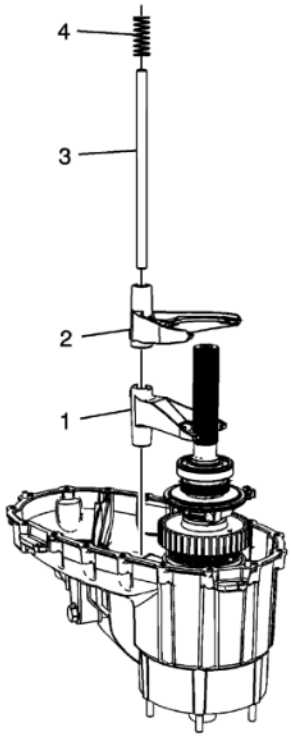



**Fig. 58: View Of Shift Fork Components**
**Courtesy of GENERAL MOTORS COMPANY**

**Shift Forks Installation**

| Callout | Component Name |
|---|---|
| 1 | Transfer Case High/Low Shift Fork<br><br>**NOTE:**<br>**Refer to Interim Model Year Design Change - NQG High/Low Shift Fork, Fork Pad, and High/Low Clutch in New Product Information.** |
| 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**

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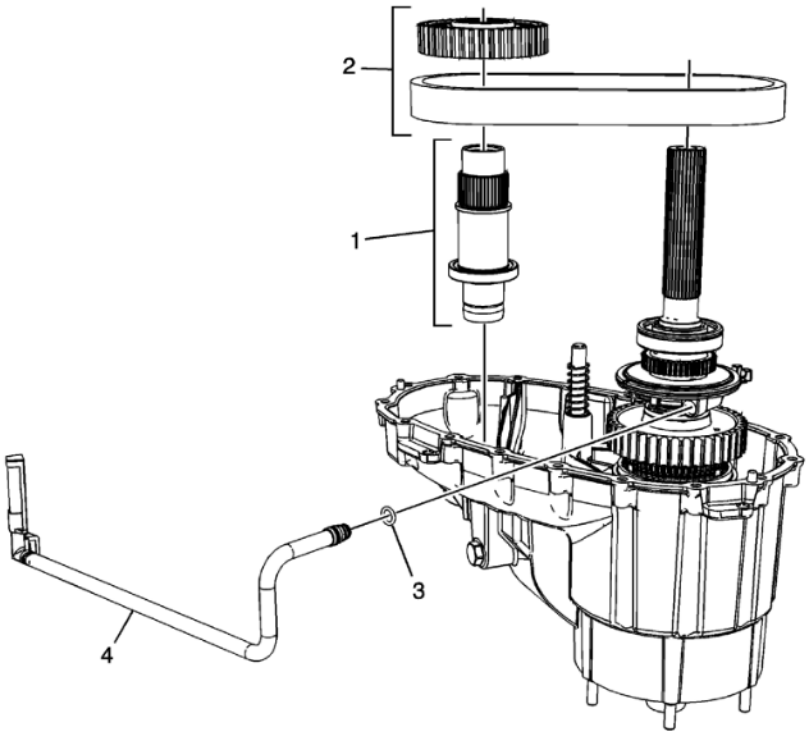



**Fig. 59: View Of Front Output Shaft Assembly, Drive Chain & Oil Pump Suction Pipe**
**Courtesy of GENERAL MOTORS COMPANY**

**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<br><br>**Procedure**<br><br>1. Install the chain with the darkened links facing up.<br>2. Engage the driven sprocket to the chain.<br>3. 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<br><br>**Procedure**<br><br>1. Lubricate the seal to ease installation.<br>2. Install the seal to the pipe prior to inserting the pipe into the pump.<br><br>**NOTE:**<br>**Use a NEW seal.** |
| 4 | Transfer Case Oil Pump Suction Pipe |

**Transfer Case Rear Case Half Installation**

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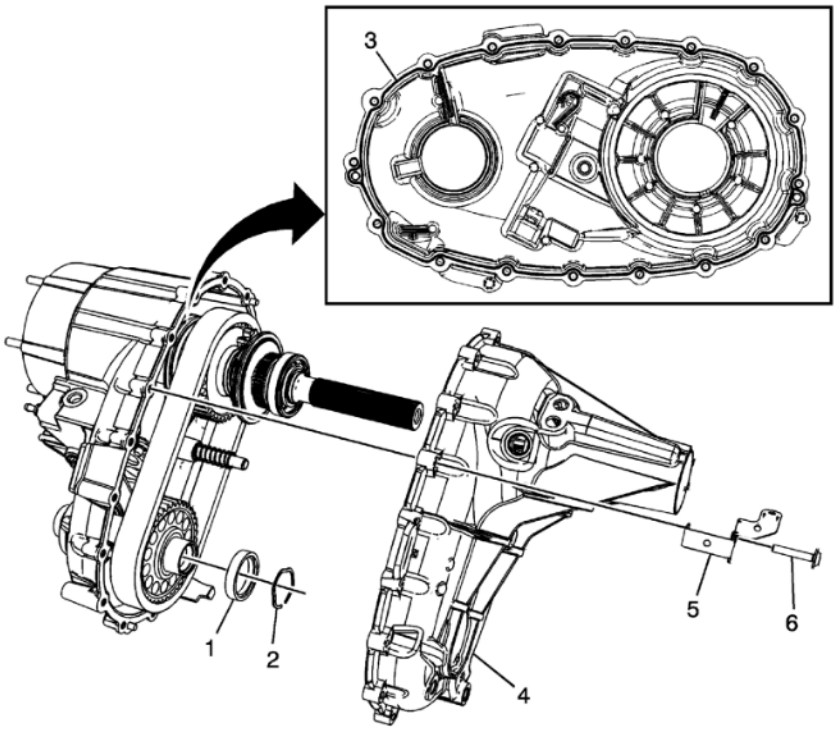



**Fig. 60: View Of Transfer Case Rear Case Half Components**
**Courtesy of GENERAL MOTORS COMPANY**

**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<br><br>**NOTE:**<br>**Ensure the spacer spring is properly positioned into the spacer groove.** |
| 3 | Transfer Case Front Case Half<br><br>**CAUTION:**<br>**Apply the proper amount of sealant to the transfer case (front half) sealing surface when assembling** |

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| Callout | Component Name |
| --- | --- |
| | **the transfer case. Excessive amounts of sealant can plug the oil pump screen, resulting in internal component failure.**<br><br>**Procedure**<br>Apply a 2 mm (0.078 in) bead of sealant to the front case half. Refer to **Adhesives, Fluids, Lubricants, and Sealers** .<br><br>**NOTE:**<br>**Ensure both sealing surfaces of the front and rear case halves are free of dirt, oil, and cleaning solvent.** |
| 4 | Transfer Case Rear Case Half<br><br>**NOTE:**<br>• **Ensure the transfer case rear output shaft outer retaining ring is in place and aligned prior to mating case halves.**<br>• **Use snap ring pliers to open the transfer case rear** |

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| Callout | Component Name |
| --- | --- |
| | output shaft outer retaining ring for the transfer case rear output shaft rear bearing assembly.<br>• 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)<br>**CAUTION:**<br>Refer to Fastener Caution .<br>**NOTE:**<br>Tighten the bolts by hand. Do not use an air gun.<br>**Tighten**<br>25 N.m (18 lb ft) |

**Rear Output Shaft Seal and Bushing Installation**

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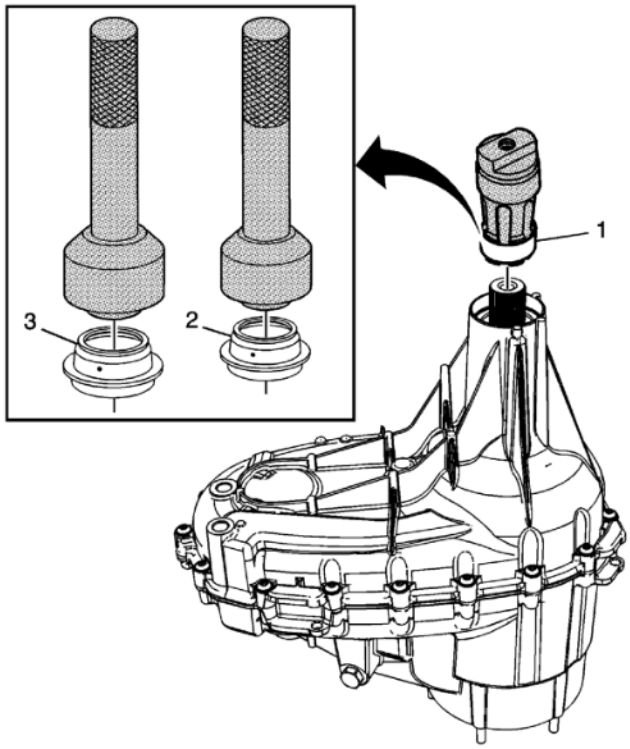



**Fig. 61: View Of Rear Output Shaft Bushing, Seals & Special Tools**
**Courtesy of GENERAL MOTORS COMPANY**

**Rear Output Shaft Seal and Bushing Installation**

| Callout | Component Name |
|---|---|
| **Preliminary Procedures**<br>The following procedure is for the light duty application, for the heavy duty and super heavy duty applications. Refer to **Rear Output Shaft Bushing Replacement**. | |
| 1 | Transfer Case Rear Output Shaft Bushing (Light Duty)<br><br>**Procedure**<br><br>1. Follow the steps above in the Preliminary Procedures for use of the **J-45380** remover/installer.<br>2. Install the bushing on the finger section of the **J-45380** remover/installer.<br>3. Install the finger section to the main body of the **J-45380** remover/installer.<br>4. Position the bushing and tool to the rear case half.<br>5. Press the bushing until the tool bottoms on the rear case half.<br><br>**NOTE:**<br>• **If the bushing was removed, a new bushing must be installed.**<br>• **Ensure** |

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| Callout | Component Name |
| --- | --- |
| | **the bushing is installed squarely into the bushing bore.**<br><br>**Special Tools**<br>**J-45380** Transfer Case Rear Bushing Remover and Installer |
| 2 | Transfer Case Rear Output Shaft Seal (Light Duty)<br><br>**NOTE:**<br>**Align the notch on the seal between the rear output bearing retaining ring access holes. This will position the weep hole down.**<br><br>**Special Tools**<br>• **DT-48210** Seal Installer<br>• **J-8092** Driver Handle |
| 3 | Transfer Case Rear Output Shaft Seal (Heavy Duty and Super Heavy Duty)<br><br>**NOTE:**<br>**Align the notch on the seal between the rear output bearing retaining ring access holes. This will position the weep hole down.**<br><br>**Special Tools** |

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| Callout | Component Name |
|---|---|
| | • **DT-48021** Seal Installer<br>• **J-8092** Driver Handle |

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

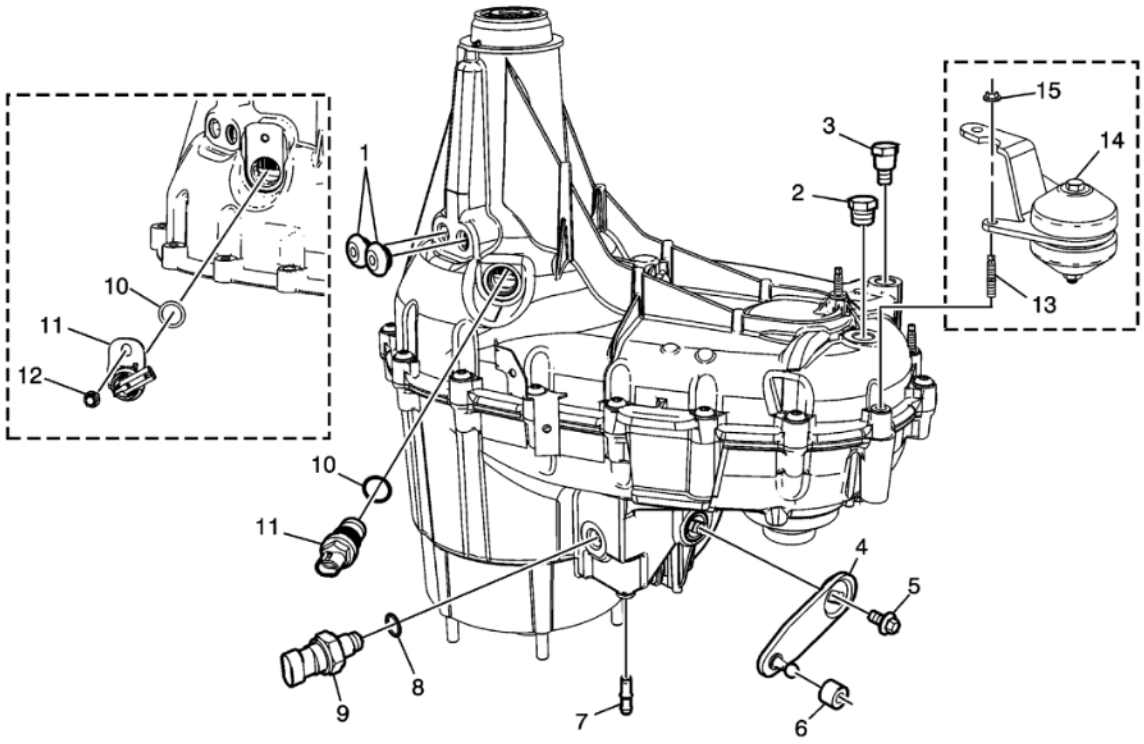



**Fig. 62: Access Hole Plugs, Fill and Drain Plug, Lever, Vent, Shift Control Switch, and Vehicle Speed Sensor**
**Courtesy of GENERAL MOTORS COMPANY**

**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<br><br>**CAUTION:**<br>**Refer to** Component Fastener Tightening Caution .<br><br>**Procedure**<br>Apply pipe sealant GM P/N 12346004 (Canadian P/N 10953480) to the oil fill plug before installation.<br>**Tighten**<br>18 N.m (13 lb ft) |

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| Callout | Component Name |
|---|---|
| 3 | Transfer Case Oil Drain Plug<br>**Procedure**<br>Apply pipe sealant GM P/N 12346004 (Canadian P/N 10953480) to the oil drain plug before installation.<br>**Tighten**<br>18 N.m (13 lb ft) |
| 4 | Transfer Case Lever |
| 5 | Transfer Case Control Lever Bolt/Screw<br>**CAUTION:**<br>**Refer to Fastener Caution .**<br>**Procedure**<br>Apply threadlocker GM P/N 12345382 (Canadian P/N 10953489) to the control lever bolt before installation.<br>**Tighten**<br>27 N.m (20 lb ft) |
| 6 | Transfer Case Shift Lever Washer |
| 7 | Transfer Case Vent<br>**Procedure**<br>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<br>**Procedure**<br>Lightly lubricate the O-ring with clean DEXRONÂ®VI. |
| 9 | Transfer Case Shift Control Switch Assembly<br>**Tighten**<br>27 N.m (20 lb ft) |
| 10 | Vehicle Speed Sensor O-ring Seal - Model Dependent<br>**Procedure**<br>Lightly lubricate the O-ring with clean DEXRONÂ®VI. |

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| Callout | Component Name |
| --- | --- |
| 11 | Vehicle Speed Sensor Assembly - Model Dependent<br><br>**NOTE:**<br>**Refer to NQF / NQG Interim Model Year Design Change - Digital Speed Sensor - RPO AVF in the New Product Information .**<br><br>**Tighten**<br>17 N.m (13 lb ft) |
| 12 | Vehicle Speed Sensor Assembly Bolt - Model Dependent<br>**Tighten**<br>10 N.m (89 lb in) |
| 13 | Transfer Case Vibration Dampener Stud - Model Dependent<br>**Tighten**<br>22 N.m (16 lb ft) |
| 14 | Transfer Case Vibration Dampener - Model Dependent<br><br>**NOTE:**<br>**Refer to NQH/NQG-LD Model Year Design Change - Addition of a Tuned Vibration Adapter (dampener) for V-6 Engine RPO LV3 Applications in the New Product Information .** |
| 15 | Transfer Case Vibration Dampener Nut - Model Dependent<br>**Tighten**<br>22 N.m (16 lb ft) |

**Input Shaft Seal and Front Output Shaft Seal Installation**

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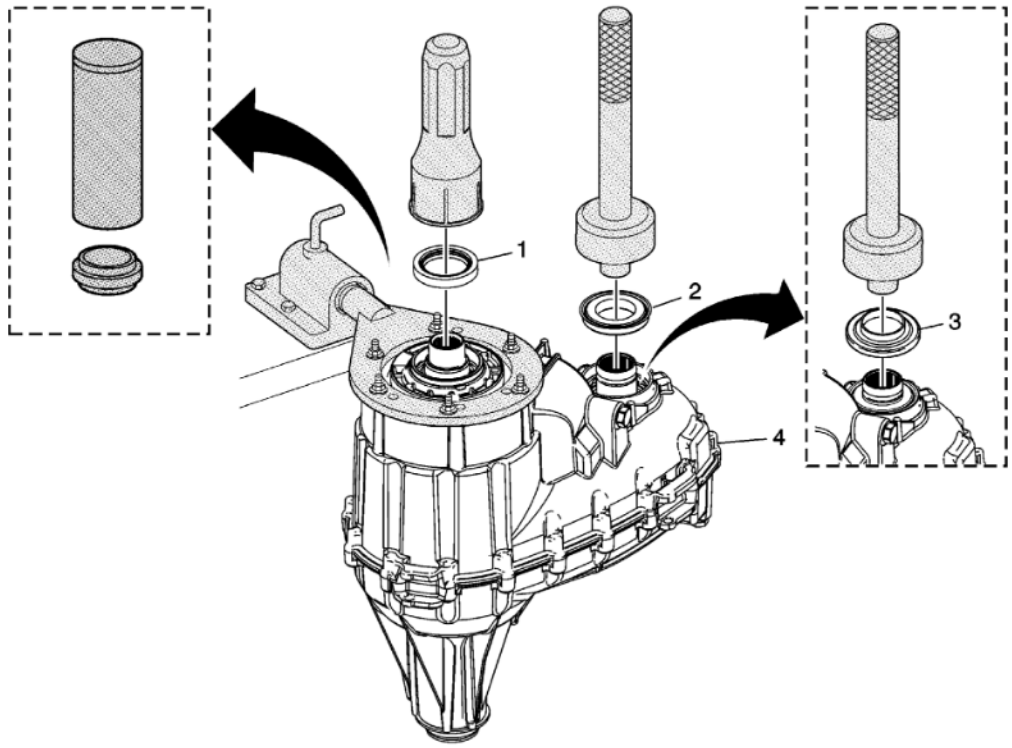



**Fig. 63: Input Shaft Seal And Front Output Shaft Seal**
**Courtesy of GENERAL MOTORS COMPANY**

**Input Shaft Seal and Front Output Shaft Seal Installation**

| Callout | Component Name |
|---|---|
| 1 | Transfer Case Input Shaft Seal<br>**Procedure**<br>Use the **DT-50648-A** or **J-42738** . Refer to Input Shaft Seal Installer Revisions in **New Product Information** .<br><br>**NOTE:**<br>• **Ensure the bore of the front case half is free of dirt, oil, and cleaning solvent.**<br>• **Double lip input shaft oil seals are used on applications with a WET adapter cavity and with 4 speed transmission RPOs M30/M70** |

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| Callout | Component Name |
| --- | --- |
| | /MW7/M99/ML9 only.<br>• Single lip input shaft oil seals are used on applications with a DRY adapter cavity and with 6 speed transmission RPOs MYC/MYD only, and are to be installed with the spring portion of the seal facing inward towards the internals of the transfer case.<br><br>**Special Tools**<br>• **DT-50648-A** Seal Installer<br>• **J-36183** Input and Output Shaft Press Tube<br>• **J-36184** Press Tube Reducer<br>• **J-42738** Seal Installer |
| 2 | Transfer Case Front Output Shaft Seal<br><br>**Special Tools**<br>• **J-8092** Driver Handle<br>• **DT-50649** Seal Installer |
| 3 | Transfer Case Front Output Shaft Oil Slinger - Model Dependent<br><br>**NOTE:**<br>Refer in Interim Model Year Design Change - NQF/NQG /NQH/NPO |

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| Callout | Component Name |
|---|---|
| | **Front Output Shaft, Deflector, and Seal in New Product Information.**<br><br>**Special Tools**<br><br>• **J-8092** Driver Handle<br>• **DT-50649** Seal Installer |
| 4 | Transfer Case Assembly<br>**Procedure**<br>Remove from **J-3289-20** Holding Fixture and remove the **J-45759** Assembly Fixture from the transfer case.<br><br>**Special Tools**<br><br>• **J-3289-20** Holding Fixture<br>• **J-45759** Assembly Fixture |

# DESCRIPTION AND OPERATION

## TRANSFER CASE IDENTIFICATION

TRANSFER CASE IDENTIFICATION (MAGNA)

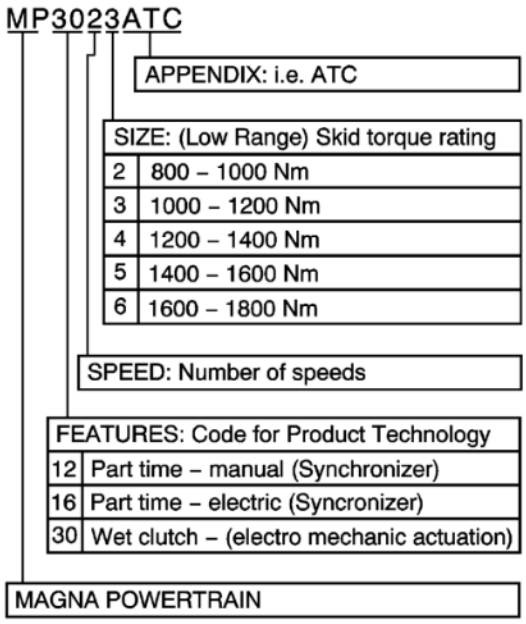



**Fig. 64: Transfer Case I.D. Label**
**Courtesy of GENERAL MOTORS COMPANY**

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**Magna Transfer Case Bar Code Label**

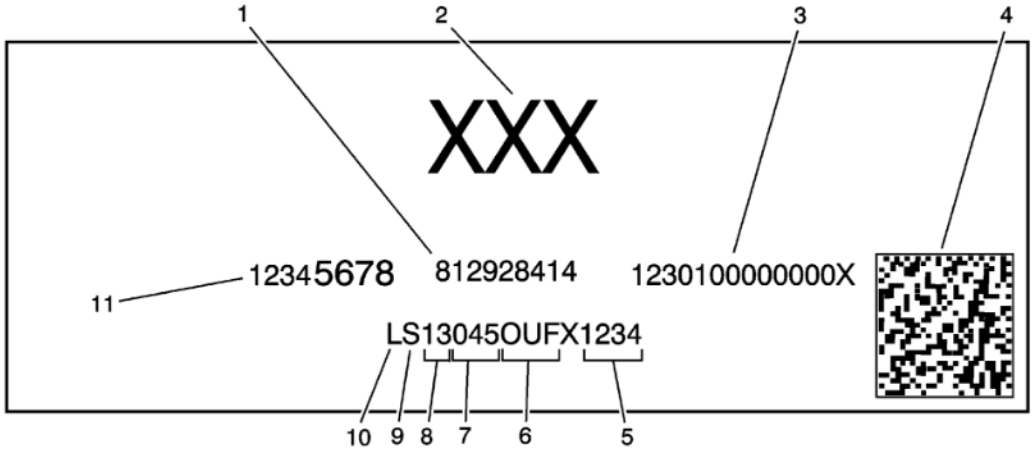



**Fig. 65: Magna Transfer Case Bar Code Label**
**Courtesy of GENERAL MOTORS COMPANY**

1. GM Duns Number
2. Broadcast Code
3. VPPS Code
4. 2D Barcode
5. Build Number - Per Day
6. Model Type
7. Julian Date
8. Build Year
9. Shift Number
10. Line Number
11. GM Assembly Part 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 manual 4 position shift lever control located in the vehicle floor plan. As required, the operator can manually select 4HI position from 2HI on-the-fly, as described in the owner's manual. A dash mounted 4WD indicator 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 4WD indicator remains ON constantly. 4LO 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 or 2.72:1 gear ratio reduction depending on model year and product content. Refer to **New Product Information** .
- N - NEUTRAL, 4 wheel

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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 4LO range position, the transfer case switch closes and supplies a ground on the 4LO 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, the 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).

### 2WD Mode Power Flow

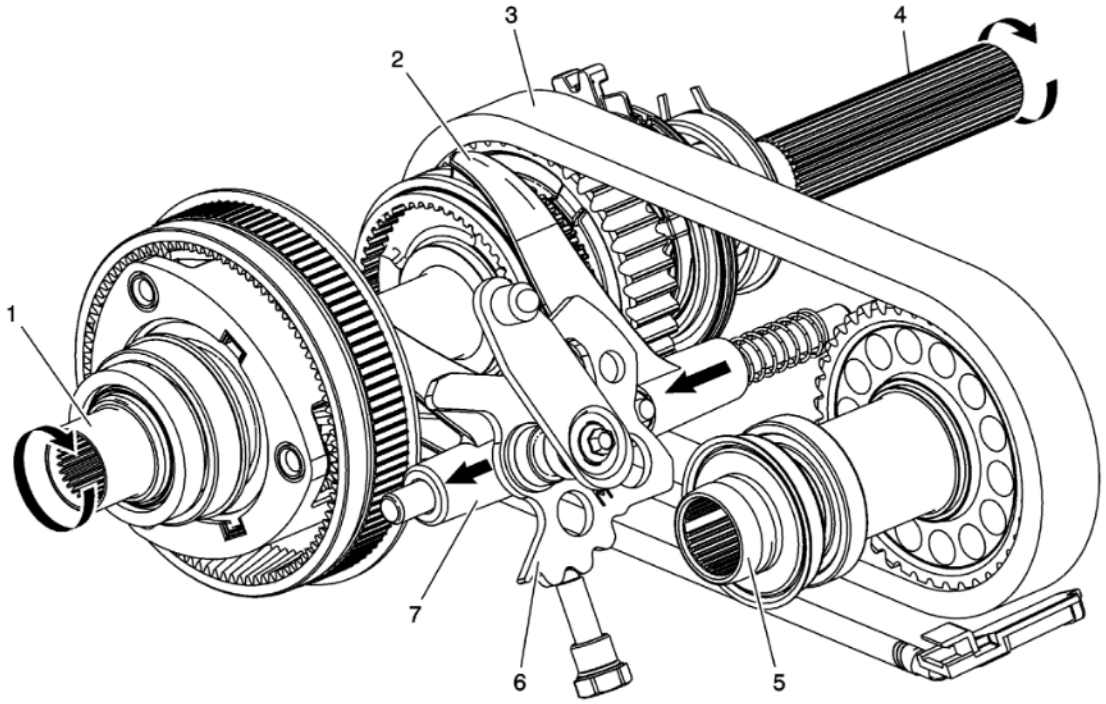



**Fig. 66: Identifying 2WD Mode Power Flow**
**Courtesy of GENERAL MOTORS COMPANY**

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| Callout | Component Name |
|---|---|
| 1 | Input Shaft |
| 2 | Two/Four Shift Fork |
| 3 | Drive Chain |
| 4 | Rear Output Shaft |
| 5 | Front Output Shaft |
| 6 | Shift Detent Lever Assembly |
| 7 | High/Low Shift Fork |

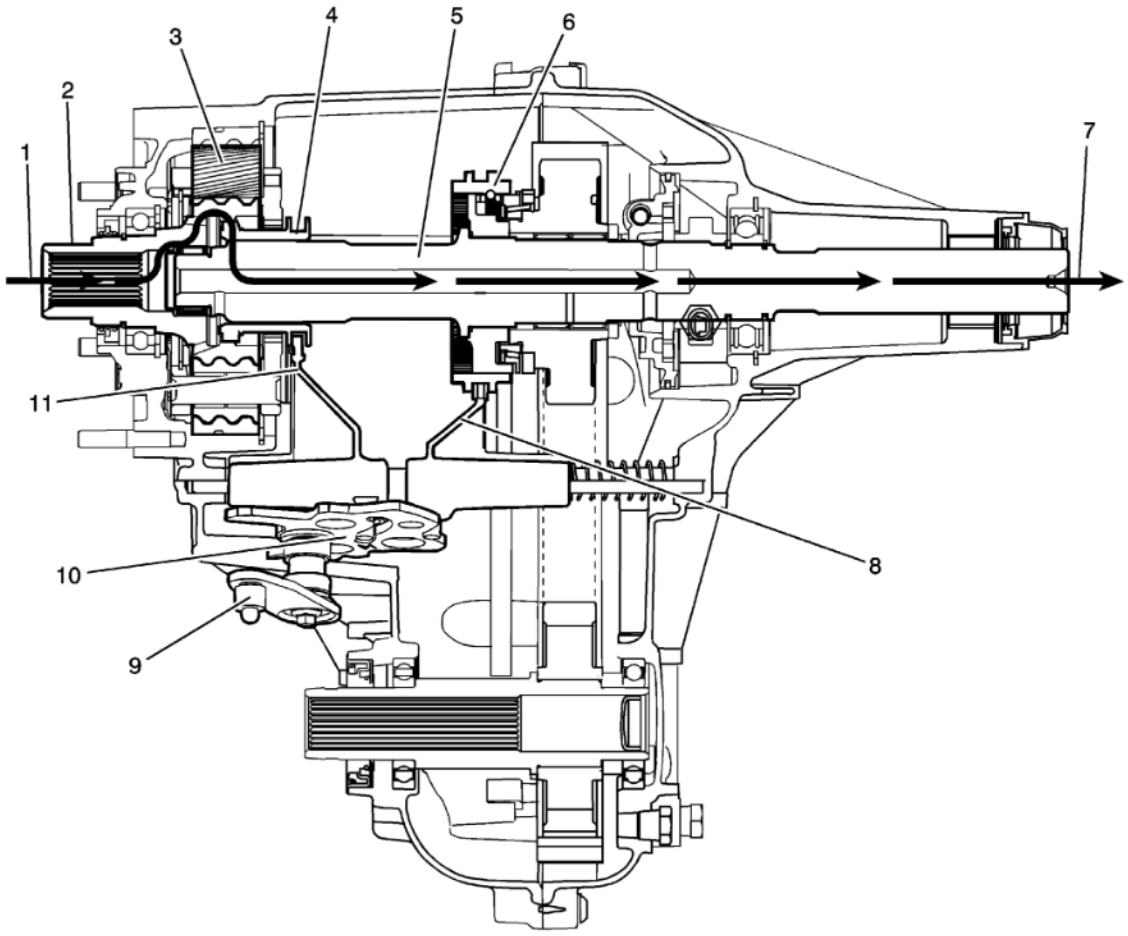



**Fig. 67: 2WD Mode Power Flow**
**Courtesy of GENERAL MOTORS COMPANY**

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**

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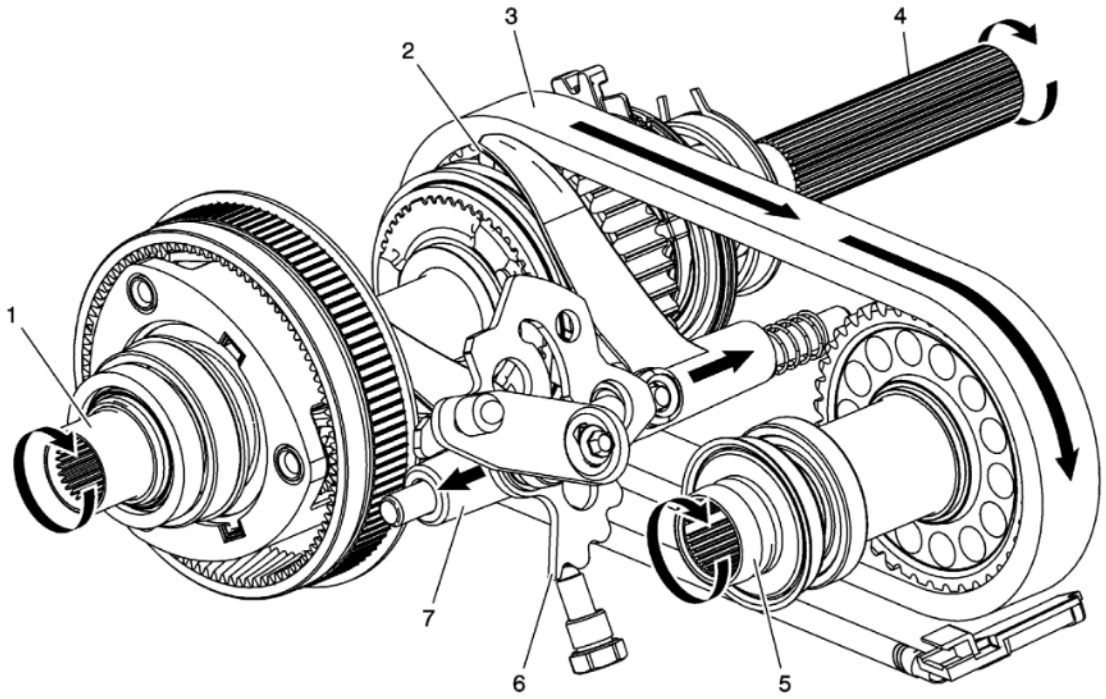



**Fig. 68: Identifying 4HI Mode Power Flow**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| 1 | Input Shaft |
| 2 | Two/Four Shift Fork |
| 3 | Drive Chain |
| 4 | Rear Output Shaft |
| 5 | Front Output Shaft |
| 6 | Shift Detent Lever Assembly |
| 7 | High/Low Shift Fork |

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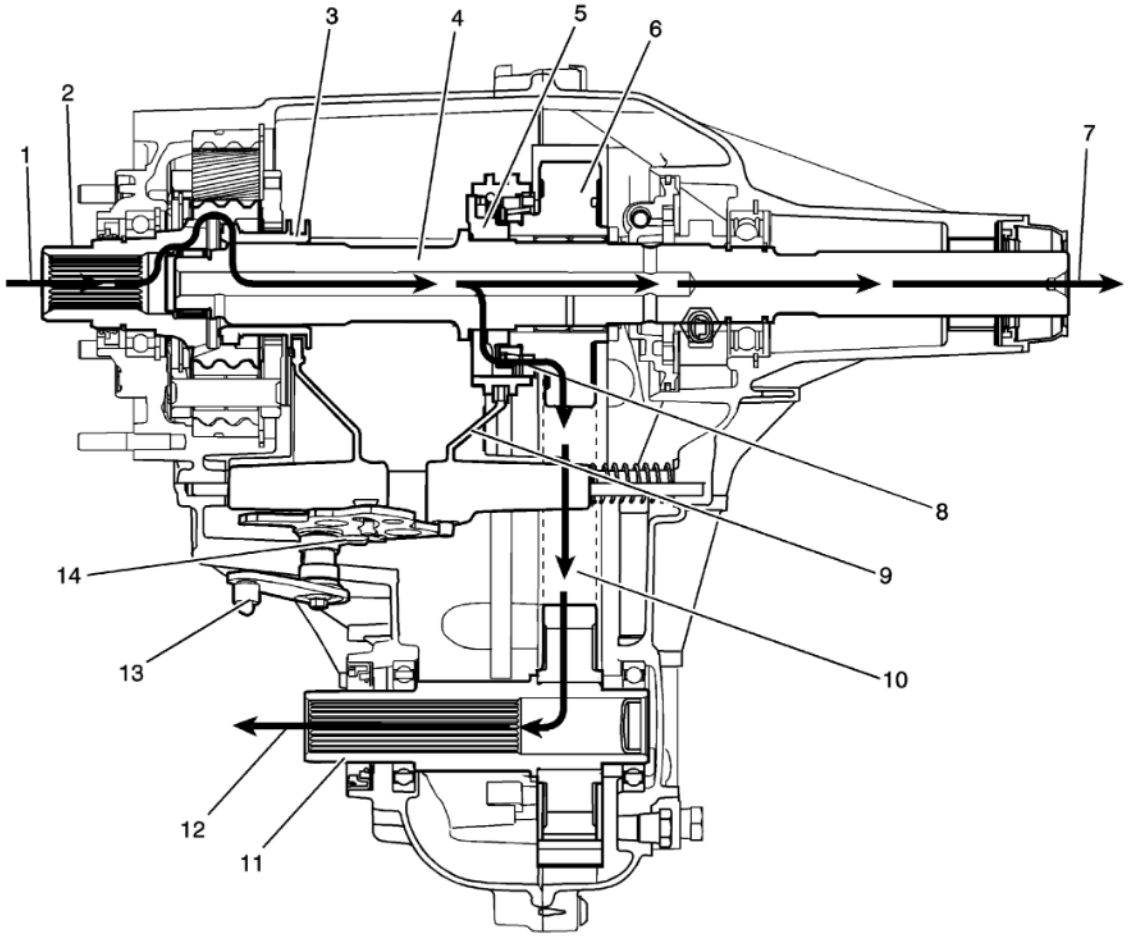



**Fig. 69: 4HI Mode Power Flow**
**Courtesy of GENERAL MOTORS COMPANY**

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

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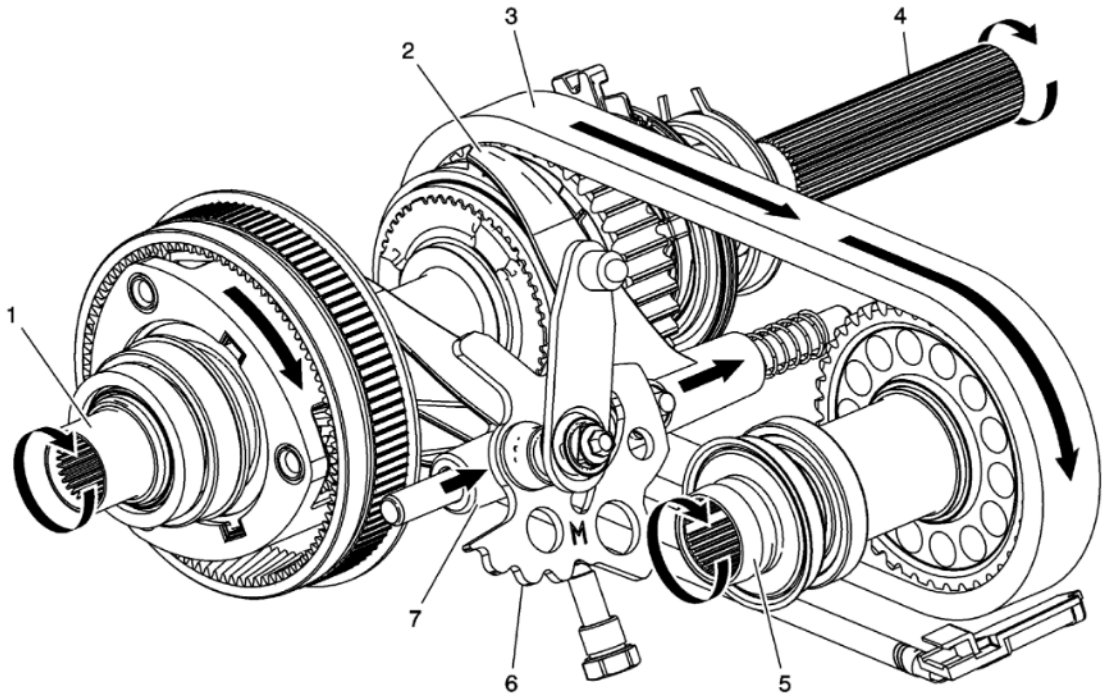



**Fig. 70: Identifying 4LO Mode Power Flow**
**Courtesy of GENERAL MOTORS COMPANY**

| Callout | Component Name |
|---|---|
| 1 | Input Shaft |
| 2 | Two/Four Shift Fork |
| 3 | Drive Chain |
| 4 | Rear Output Shaft |
| 5 | Front Output Shaft |
| 6 | Shift Detent Lever Assembly |
| 7 | High/Low Shift Fork |

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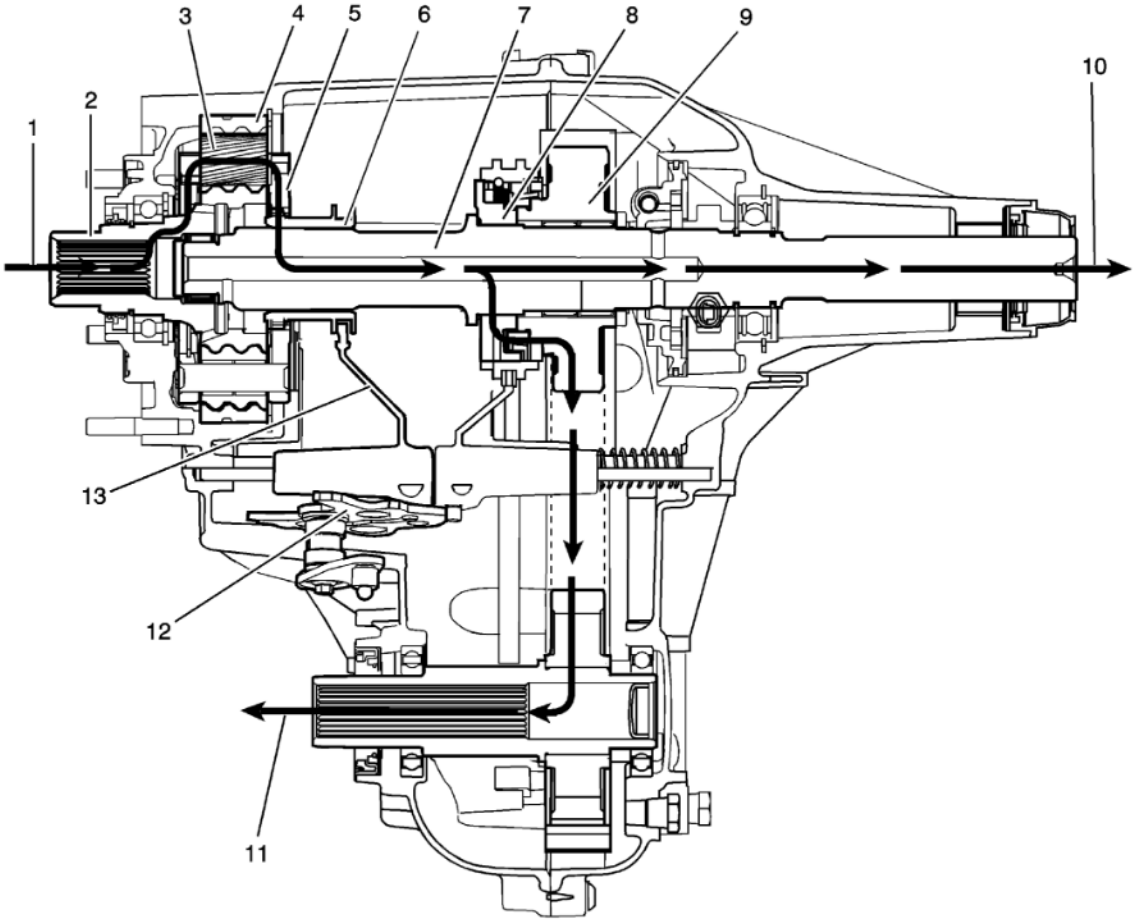



**Fig. 71: 4LO Mode Power Flow**
**Courtesy of GENERAL MOTORS COMPANY**

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.

## NEW PRODUCT INFORMATION

The purpose of New Product Information is to document, important product changes which occur either model year-to-model year or interim model year.

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Changes may include one or more of the following items:

- Specification Changes
- New sealants and/or adhesives
- Disassembly and assembly procedure revisions
- Mechanical and diagnostic procedure revisions
- New special tools required
- Interim model year design changes
- A component comparison from the previous model year

**2017 NQF/NQG- Interim Model Year Design Change - DT-51204 - New Design Case Separating Tool**

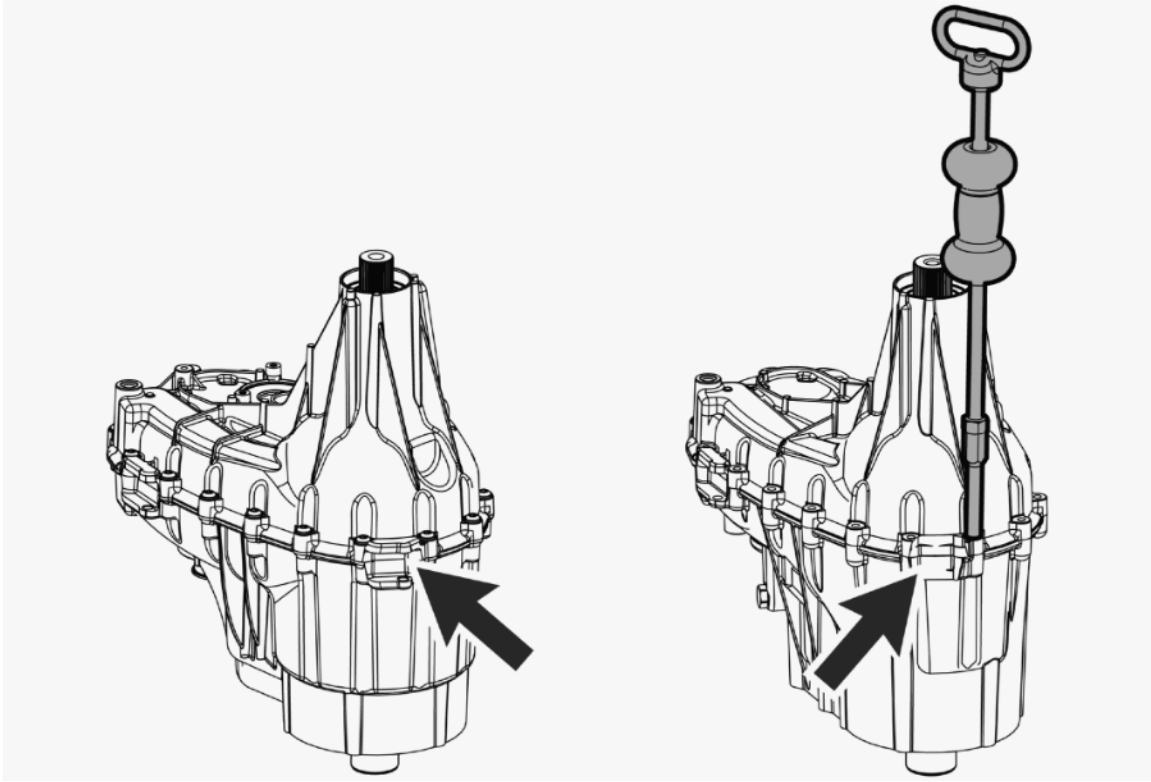


**Fig. 72: 2017 NQF/NQG- Interim Model Year Design Change -- DT--51204 - New Design Case Separating Tool**
**Courtesy of GENERAL MOTORS COMPANY**

For 2017MY super heavy duty NQF / NQG transfer cases with diesel engine and Alison transmission, one pair of the transfer case case-half separating flanges have been removed to address in-vehicle packaging concerns.

With the removal of the case separating flanges, a new design tool has been developed. **DT-51204** Case Separating Tool has been created to assist the technician when performing disassembly of the transfer case. The new design tool is to be used in conjunction with **GE-02619-A** Slide Hammer when separating the case halve.

**2016 NQF / NQG with MW7 Transmission Interim Model Year Design Change - Front Case Half - Addition of Transmission Extension Housing Seal and New Design Gasket**

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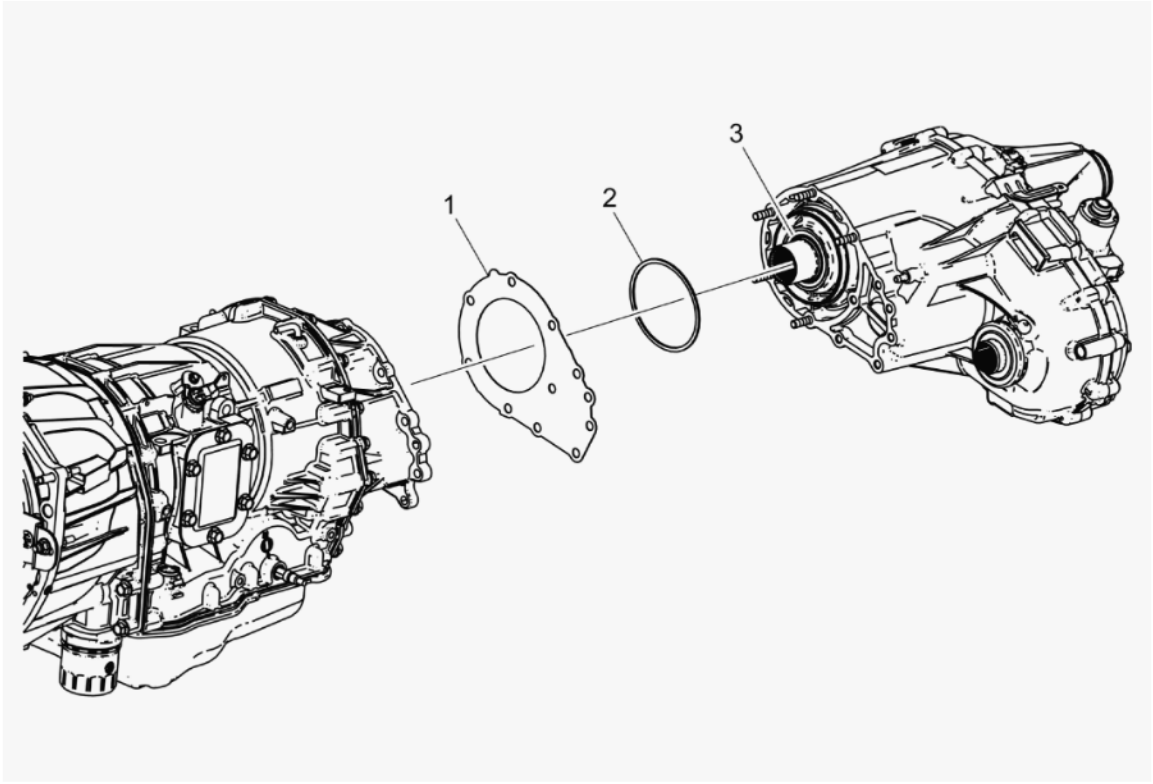



**Fig. 73: 2016 NQF/NQG With MW7 Transmission Interim Model Year Design Change - Front Case Half**
**Courtesy of GENERAL MOTORS COMPANY**

Interim 2016 MY,a new design seal (2) has been added to the rear of transmission extension housing and front of transfer case interface. A new design gasket (1) is to be used in conjunction with the new seal. The purpose of the seal is to control and limit the amount of transmission fluid that enters the wet-cavity area.

Earlier applications do not have the seal. When servicing an older application that does not have the seal, it is recommended to install the new seal and new design gasket prior to reassembly.

The new gasket is required when using the new seal. When installed, the seal should be fully seated against front of the Transfer case (3).

**2015 NQF/NQG- Interim Model Year Design Change (RPO-AVF) - Digital Speed Sensor**

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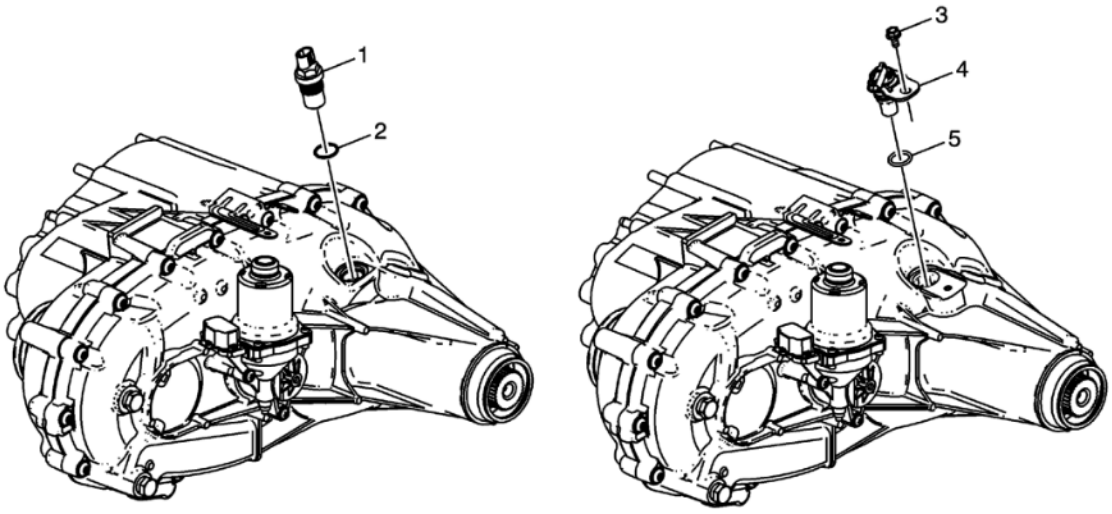



**Fig. 74: 2015 NQF/NQG- Interim Model Year Design Change (RPO-AVF) -- Digital Speed Sensor**
**Courtesy of GENERAL MOTORS COMPANY**

1. Vehicle Speed Sensor - Non-Digital Assembly
2. Vehicle Speed Sensor - Non-Digital Assembly Seal (O-ring)
3. Vehicle Speed Sensor - Digital Assembly Bolt
4. Vehicle Speed Sensor - Digital Assembly
5. Vehicle Speed Sensor - Digital Assembly Seal (O-ring)

The RPO-AVF designation was used interim 2015 MY to provide a break-point for a variety of changes that occurred for K-truck applications. The transfer case digital speed sensor change is just one of many within the RPO-AVF designation. Refer to applicable service bulletins for additional information.

Interim 2015 model year for Magna HD NQF and NQG transfer case applications with Duramax engine and Allison transmission (RPO-MW7), a NEW design digital speed sensor (4) is to be implemented.

Non-AVF applications will continue to use the threaded-into-the-rear case design speed sensor (1). Applications with RPO AVF will include a non-threaded push-into-the-bore design speed sensor (4) that is retained by a bolt (3).

To differentiate between digital speed sensor (4) and non-digital speed sensor (1) applications, the RPO AVF is used to identify digital sensor applications.

**2015 NQH-HD Model Year Design Change - Addition of a NQH Transfer Case with HD Internal Components**

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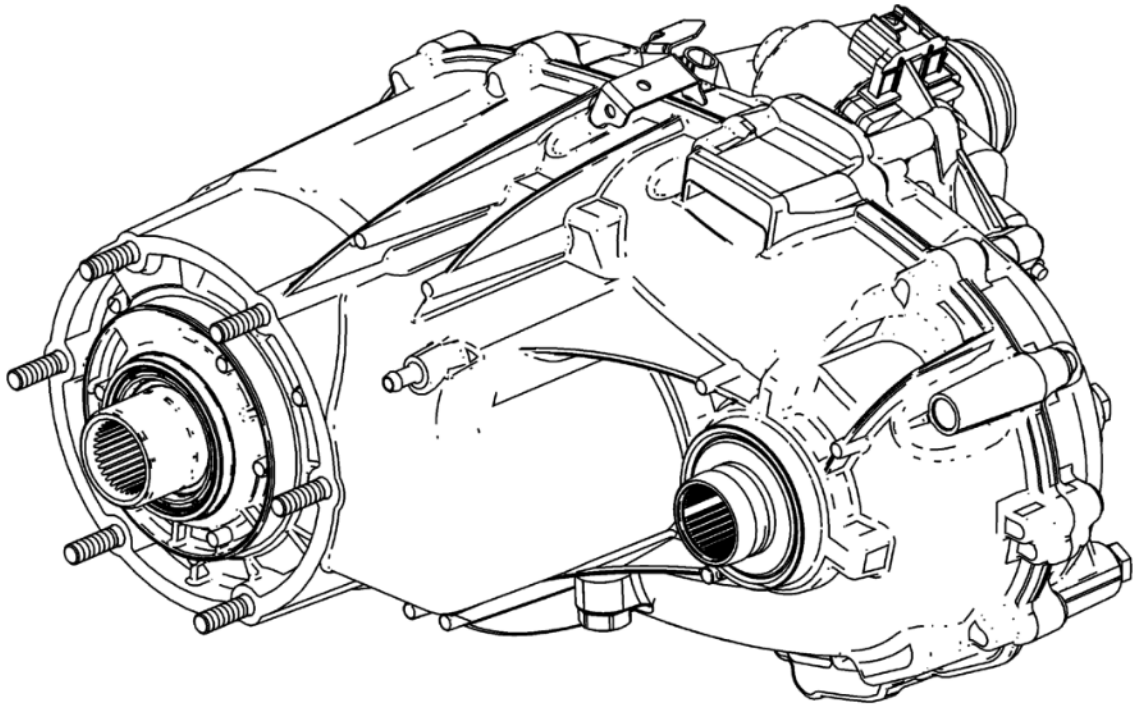


**Fig. 75: 2015 NQH-HD Model Year Design Change -- Addition of a NQH Transfer Case with HD Internal Components**

**Courtesy of GENERAL MOTORS COMPANY**

Beginning in 2015 model year for 3500 series SUV only, a HD version of the NQH transfer case will be available. Changes include, but not limited to:

- Six pinion planetary carrier
- HD drive chain and sprockets
- HD rear output shaft

**2014 NQH/NQG-LD Model Year Design Change - Addition of a Tuned Vibration Adapter (dampener) for V-6 Engine RPO LV3 Applications**

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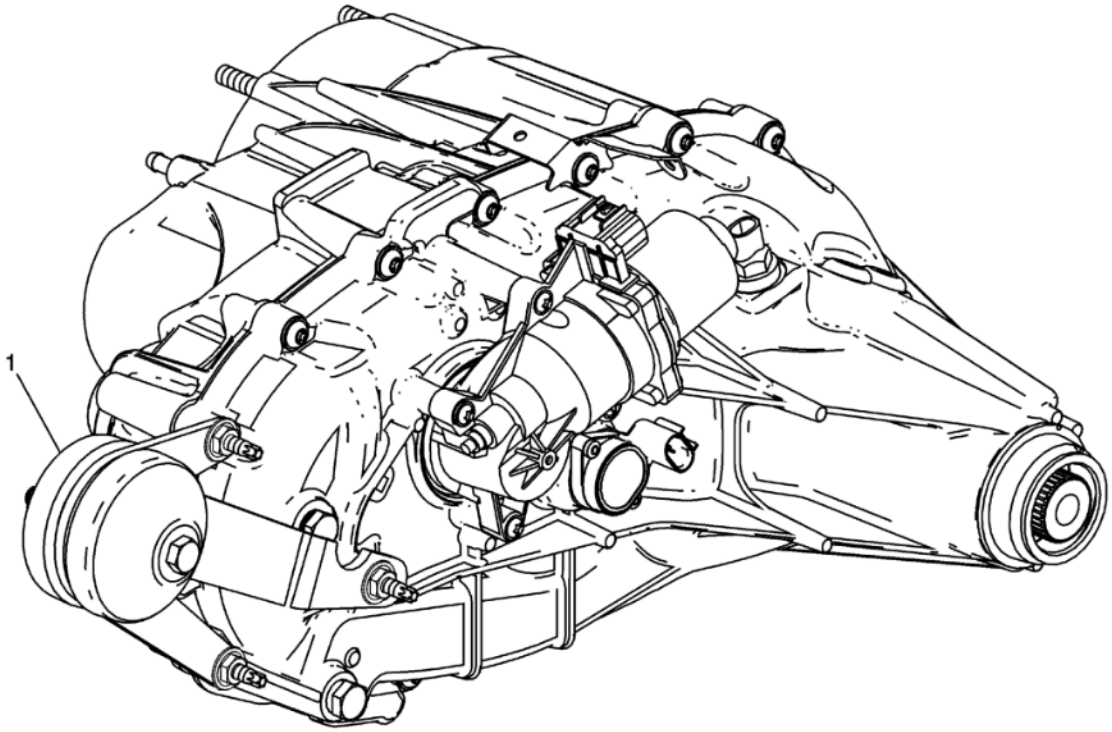



**Fig. 76: Tuned Vibration Adapter (Dampener)**
**Courtesy of GENERAL MOTORS COMPANY**

Beginning in 2014 model year for V-6 engine RPO LV3 applications, a dampener (1) has been added to the exterior of the NQH and NQG-LD transfer cases.

### 2013 Input Shaft Seal Installer Revisions

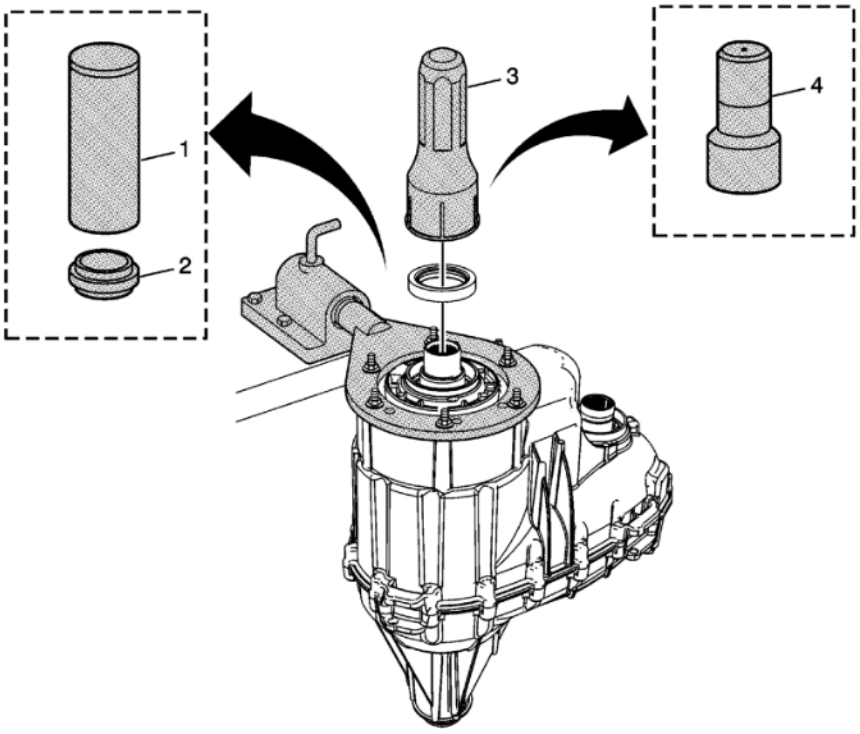



**Fig. 77: Input Shaft Seal Installer Revisions**
**Courtesy of GENERAL MOTORS COMPANY**

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Beginning July 2013, a NEW input shaft seal installer has been identified for Magna transfer case applications (all model years and all RPOs). The new seal installer is identified as **DT-50648-A** Seal Installer (4). The **DT-50648-A** Seal Installer is to be used in place of **J-42738** Seal Installer (3), as well as **J-36183** Press Tube (1) and **J- 36184** Press Tube Reducer (2). **J-42738** Seal Installer is to be discontinued and no longer available.

### 2012 Interim Model Year Design Change - NQF/NQG/NQH Front Case Half Assembly, Input Shaft, Planetary Carrier High/Low Clutch

Interim 2012 model year for Magna light-duty and heavy-duty transfer case RPOs NQF / NQG / NQH, a second-design front case half assembly, planetary internal gear, gear retaining ring, locking plate, thrust washer-front, input shaft, pilot bearing, thrust washer-rear, high/low planetary carrier, and high/low clutch were implemented into second-design assemblies.

The second-design light duty (LD), heavy duty (HD), and super-heavy duty (SHD) applications have a reduced OD dimension carrier and the second-design planetary internal gear has a reduced ID dimension. The planetary internal gear is a press-fit non-serviceable component and must be serviced with the front case half assembly. In service it is possible that a new or remanufactured transfer case may contain first or second-design content.

If a second-design transfer case has been installed into a vehicle that originally contained a first-design assembly, TCCM reprogramming is not required.

### Assembly and Component Identification

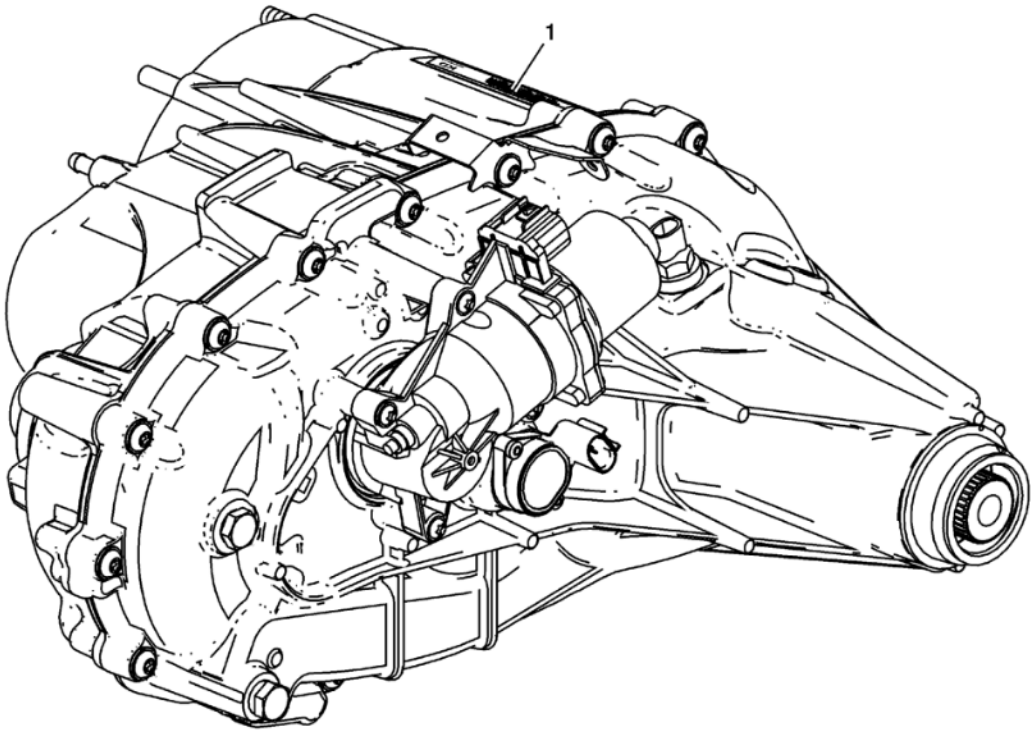



**Fig. 78: Transfer Case Assembly Bar Code Label**
**Courtesy of GENERAL MOTORS COMPANY**

1. Check the transfer case assembly bar code label (1) to determine if the assembly contains first or second design components. Refer to: Magna Transfer Case Bar Code Label and the Production Assembly Breakpoints Table.

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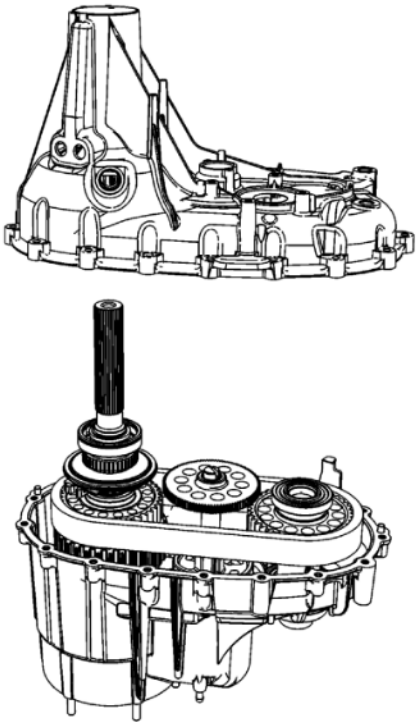


**Fig. 79: Separated Case Halves**
**Courtesy of GENERAL MOTORS COMPANY**

2. Separate the case halves. Refer to: **Transfer Case Disassemble (Heavy Duty)** .

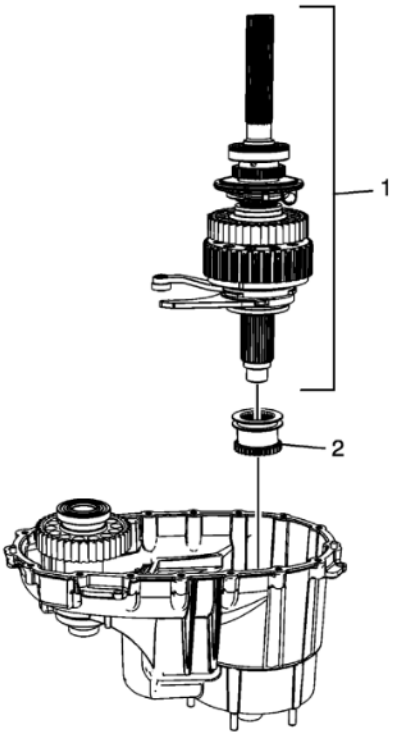



**Fig. 80: Rear Output Shaft Assembly And High/Low Clutch**
**Courtesy of GENERAL MOTORS COMPANY**

3. Remove the rear output shaft assembly (1) and the high/low clutch (2).

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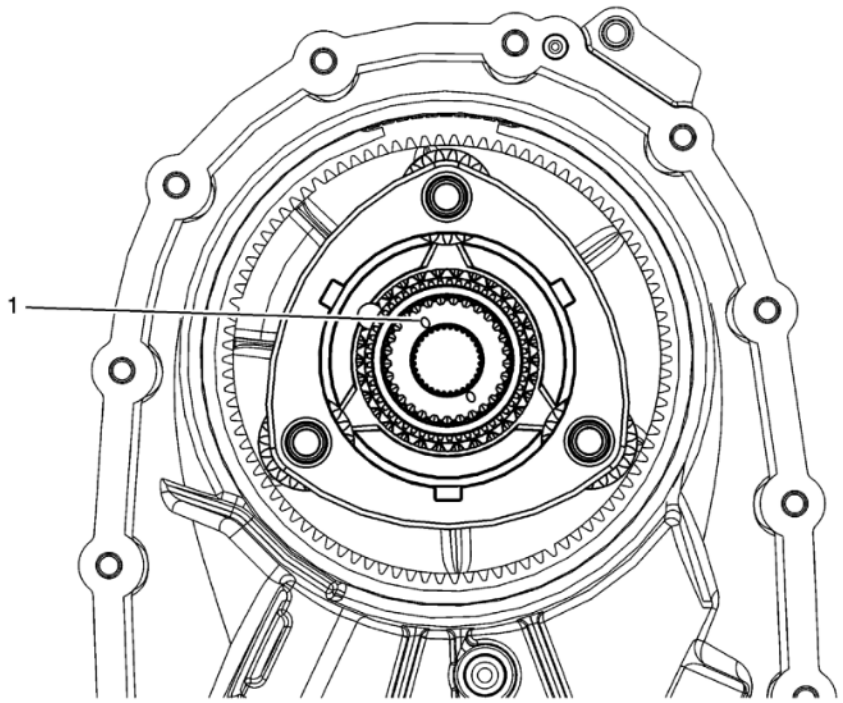
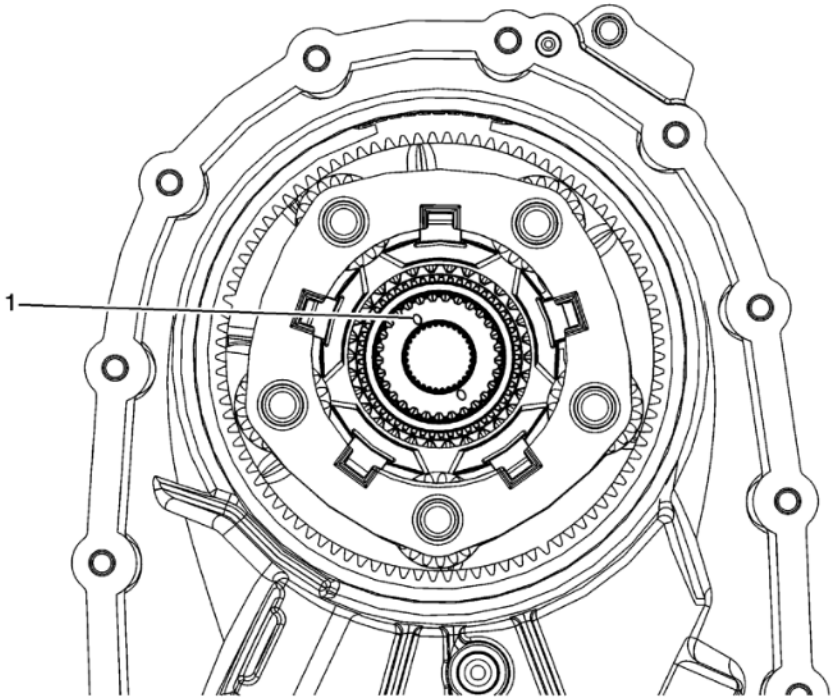



**Fig. 81: Oil Drain Holes**
**Courtesy of GENERAL MOTORS COMPANY**

4. Inspect the rear face of the input shaft. (LD)

   A light duty assembly with first design components can be identified by an input shaft with 2 oil drain holes (1) 180 degrees apart.

   A light duty assembly with second design components can be identified by an input shaft with 3 oil drain holes 120 degrees apart.




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**Fig. 82: Oil Drain Holes**
**Courtesy of GENERAL MOTORS COMPANY**

5. Inspect the rear face of the input shaft. (HD)

   A heavy duty assembly with first design components can be identified by an input shaft with 2 oil drain holes (1) 180 degrees apart.

   A heavy duty assembly with second design components can be identified by an input shaft with 3 oil drain holes 120 degrees apart.

6. Refer to: Appropriate Parts Identification Table.

### Magna Transfer Case Bar Code Label

The design level and component content of the transfer case can be determined by referencing the assembly part number located on the identification label.




**Fig. 83: Magna Transfer Case Bar Code Label**
**Courtesy of GENERAL MOTORS COMPANY**

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
8. GM Assembly Part Number

### Production Assembly Breakpoints

| First Design Assembly PN | Second Design Assembly PN | RPO | Approximate Production Breakpoint | Vehicle/Transmission RPO |
|---|---|---|---|---|
| 24256476 | 24261560 | NP0 | March 2012 | K100 / MYC |
| 24256475 | 24261517 | NQH | January 2012 | K200 / MYD |
| 24256474 | 24261516 | NQH | January 2012 | K100 / M99 |

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| First Design Assembly PN | Second Design Assembly PN | RPO | Approximate Production Breakpoint | Vehicle/Transmission RPO |
|---|---|---|---|---|
| 24256473 | 24261515 | NQH | January 2011 | K100 / M30 |
| 24256472 | 24261514 | NQH | December 2011 | K100 / MYC |
| 24257578 | 24261513 | NQF | December 2011 | K200 / MYD |
| 24257577 | 24261512 | NQF | January 2012 | K200 / 300 / MW7 |
| 24257576 | 24261511 | NQF | December 2011 | K200 / 300 / MYD |
| 24257581 | 24261510 | NQG | January 2011 | K200 / MYD / +Z49 |
| 24257580 | 24261509 | NQG | January 2012 | K200 / 300 / MW7 |
| 24257579 | 24261508 | NQG | December 2011 | K200 / 300 / MYD / -Z49 |
| 24252685 | 24261507 | NQG | December 2011 | K100 / M30 |
| 24252684 | 24261506 | NQG | January 2011 | K100 / MYC |

**Magna Light Duty NQG/NQH/NP0 - First Design**

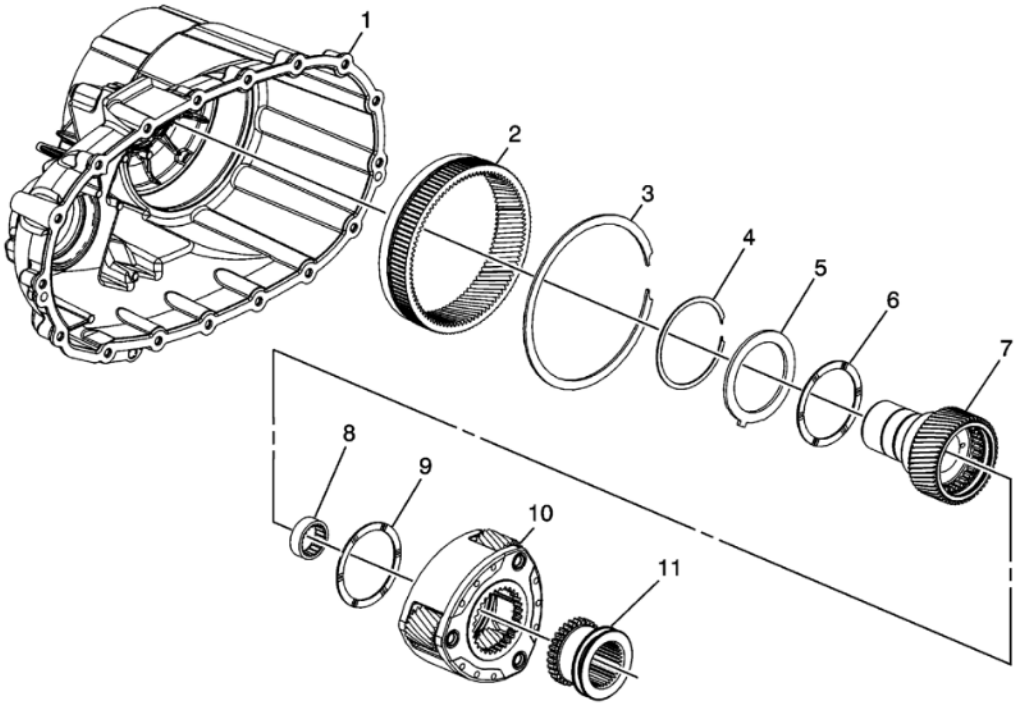



**Fig. 84: Transfer Case Exploded View**
**Courtesy of GENERAL MOTORS COMPANY**

| Magna Light Duty NQG/NQH/NP0 - First Design | | | |
|---|---|---|---|
| **Callout** | **Description** | **GM PN** | **Service Usage** |
| 1 | Front Case Half Assembly - w/gear (2) and ring 3) | 19132998 | NQH |
| 1 | Front Case Half Assembly - w/gear (2) and ring (3) | 19133000 | NQG |
| 1 | Front Case Half Assembly - w/o gear (2) and ring (3) | 19255999 | NP0 |

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| Magna Light Duty NQG/NQH/NP0 - First Design | | | |
|---|---|---|---|
| **Callout** | **Description** | **GM PN** | **Service Usage** |
| 2 | High/Low Internal Gear-Not serviceable-part of case assembly | NO/PN | NQG/NQH |
| 3 | High/Low Internal Gear Retaining Ring | 19133009 | NQG/NQH |
| 4 | High/Low Planetary Carrier Retaining Ring | 19132997 | NQG/NQH |
| 5 | High/Low Locking Plate-Single tab design | 19132996 | NQG/NQH |
| 6 | Thrust Washer-Front-No tab design | 19132995 | NQG/NQH |
| 7 | Input Shaft Assembly - w/pilot bearing | 19132977 | NQG/NQH-w/M30 |
| 7 | Input Shaft Assembly-w/pilot bearing | 19132978 | NQH-w/M99 |
| | | | NQG/ NQH-w/MYC |
| 7 | Input Shaft Assembly-w/pilot bearing | 19255997 | NP0-w/MYC |
| 8 | Pilot Bearing | 19132983 | NQG/NQH/NP0 |
| 9 | Thrust Washer-Rear-No tab design | 19132995 | NQG/NQH |
| 10 | High/Low Planetary Carrier Assembly- Three pinion design | 19132986 | NQG/NQH |
| 11 | High/Low Clutch | 19260068 | NQG/NQH - w/M30 |
| 11 | High/Low Clutch | 19260067 | NQG/NQH w/MYC and NQH w/M99 |

**Magna Light Duty NQG/NQH/NP0 - Second Design**

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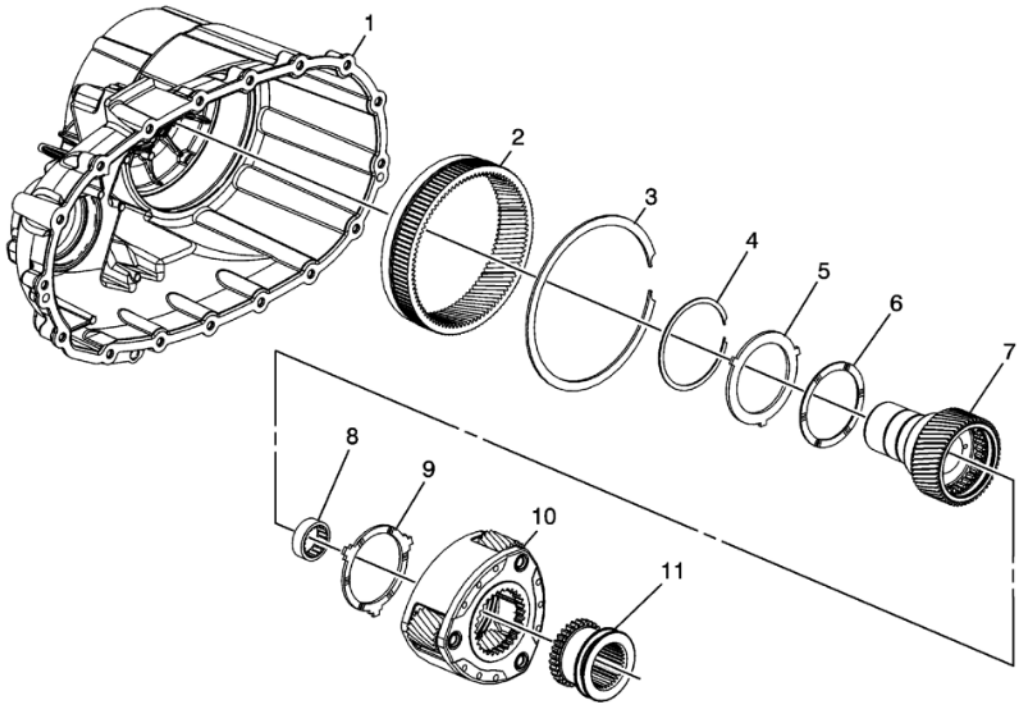



**Fig. 85: Light Duty NQG/NQH/NP0**
**Courtesy of GENERAL MOTORS COMPANY**

| Magna Light Duty NQG/NQH/NP0 - Second Design | | | |
|---|---|---|---|
| **Callout** | **Description** | **GM PN** | **Service Usage** |
| 1 | Front Case Half Assembly - w/gear (2) and ring (3) | 19299077 | NQH |
| 1 | Front Case Half Assembly - w/gear (2) and ring (3) | 19299078 | NQG |
| 1 | Front Case Half Assembly - w/o gear (2) and ring (3) | 19299076 | NP0<br>**NOTE:**<br>**The second design NP0 front case half assembly is interchangeable with first design** |
| 2 | High/Low Internal Gear-Not serviceable-part of case assembly | NO/PN | NQG/NQH |
| 3 | High/Low Internal Gear Retaining Ring | 14037953 | NQG/NQH |
| 4 | High/Low Planetary Carrier Retaining Ring | 15547397 | NQG/NQH |
| 5 | High/Low Locking Plate-three tab design | 19300745 | NQG/NQH |
| 6 | Thrust Washer-Front - No tab design | 12470959 | NQG/NQH |

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| Magna Light Duty NQG/NQH/NP0 - Second Design | | | |
|---|---|---|---|
| **Callout** | **Description** | **GM PN** | **Service Usage** |
| 7 | Input Shaft Assembly- w/pilot bearing | 19299085 | NQG/NQH-w/M30 |
| 7 | Input Shaft Assembly - w/pilot bearing | 19299088 | NQH-w/M99 |
| | | | NQG/NQH-w/MYC |
| 7 | Input Shaft Assembly- w/pilot bearing | 19255997 | NP0-w/MYC |
| 8 | Pilot Bearing | 19132983 | NQG/NQH/NP0 |
| 9 | Thrust Washer-Rear- Three tab design | 19300746 | NQG/NQH |
| 10 | High/Low Planetary Carrier Assembly- Three pinion design | 19299090 | NQG/NQH |
| 11 | High/Low Clutch | 19299092 | NQG/NQH - w/M30 |
| 11 | High/Low Clutch | 19299093 | NQG/NQH w/MYC and NQH w/M99 |

**Magna Heavy Duty NQF/NQG/NQH - First Design**

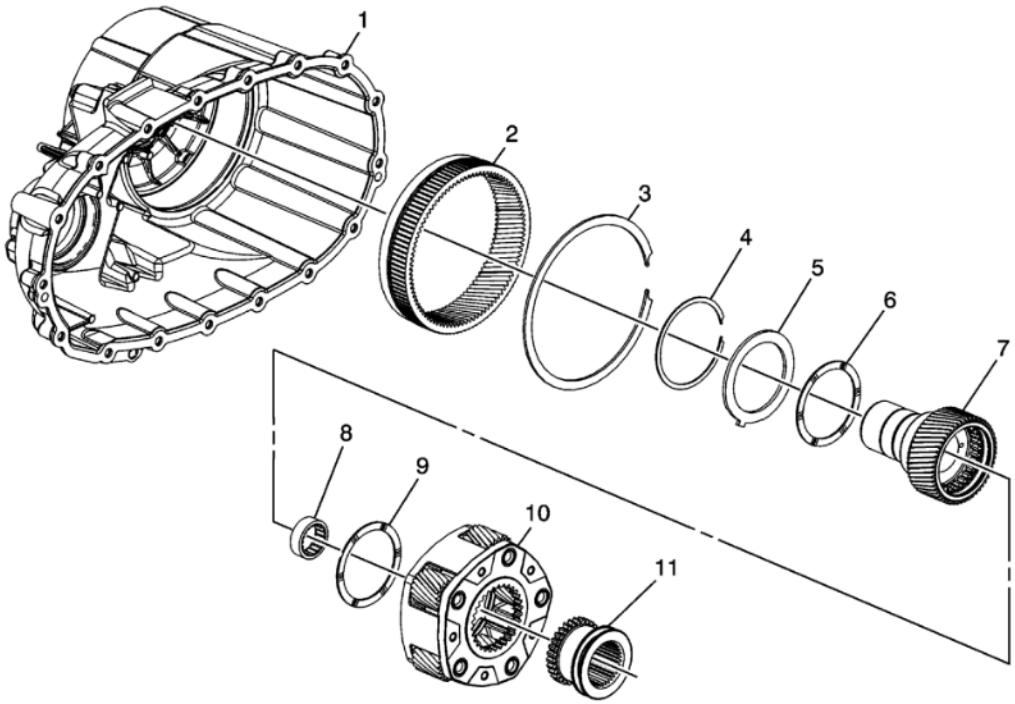



**Fig. 86: NQF/NQG/NQH -- First Design**
**Courtesy of GENERAL MOTORS COMPANY**

**NOTE:** **2007-10MY Heavy Duty NQF transfer case assemblies were only produced with first-design content. Service 2007-10MY Heavy Duty NQG transfer case service assemblies may contain either first or second design content.**

| Magna Heavy Duty NQF/NQG/NQH - First Design | | | |
|---|---|---|---|
| **Callout** | **Description** | **GM PN** | **Service Usage** |

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| Magna Heavy Duty NQF/NQG/NQH - First Design | | | |
|---|---|---|---|
| **Callout** | **Description** | **GM PN** | **Service Usage** |
| 1 | Front Case Half Assembly w/gear (2) and ring (3) | 19257420 | 2011-13 NQF |
| 1 | Front Case Half Assembly w/gear (2) and ring (3) | 19133000 | 2007-10 NQG |
| 1 | Front Case Half Assembly w/gear (2) and ring (3) | 19259038 | 2011-13 NQG |
| 1 | Front Case Half Assembly w/gear (2) and ring (3) | 19132998 | 2007-13 NQH |
| 2 | High/Low Internal Gear-Not serviceable-part of case assembly | NO/PN | NQF/NQG/NQH |
| 3 | High/Low Internal Gear Retaining Ring | 19133009 | NQF/NQG/NQH |
| 4 | High/Low Planetary Carrier Retaining Ring | 19132997 | NQF/NQG/NQH |
| 5 | High/Low Locking Plate-Single tab design | 19132996 | NQF/NQG/NQH |
| 6 | Thrust Washer-No tab design - Front | 19132995 | NQF/NQGF/NQH |
| 7 | Input Shaft Assembly w/pilot bearing | 19132979 | NQH w/MYD |
| | | | 07-10MY NQF/NQG w/MYD and MW7 |
| 7 | Input Shaft Assembly-w/pilot bearing | 19257419 | 2007-13 NQF/NQG w/MYD |
| 7 | Input Shaft Assembly-w/pilot bearing | 19259039 | 2011-13 NQF/NQG w/MW7 |
| 8 | Pilot Bearing | 19259040 | 2011-13MY NQF/NQG w/MW7 |
| 8 | Pilot Bearing | 19132984 | 2007-10MY NQF/NQG/NQH - w/ MW7 / MYD |
| | | | 2007-13 NQH w/MYD |
| | | | 2011-13 NQF/NQG w/ MYD |
| 9 | Thrust Washer-No tab design-Rear | 19132995 | NQG/NQH |
| | | | 2011-13 NQF |
| 10 | High/Low Planetary Carrier Assembly-Five pinion design | 19132987 | NQG/NQH |
| | | | 2011-13 NQF |
| 11 | High/Low Clutch | 19260067 | NQG/NQH |
| | | | 2011-13 NQF |

**Magna Heavy Duty NQF/NQG/NQH - Second Design**

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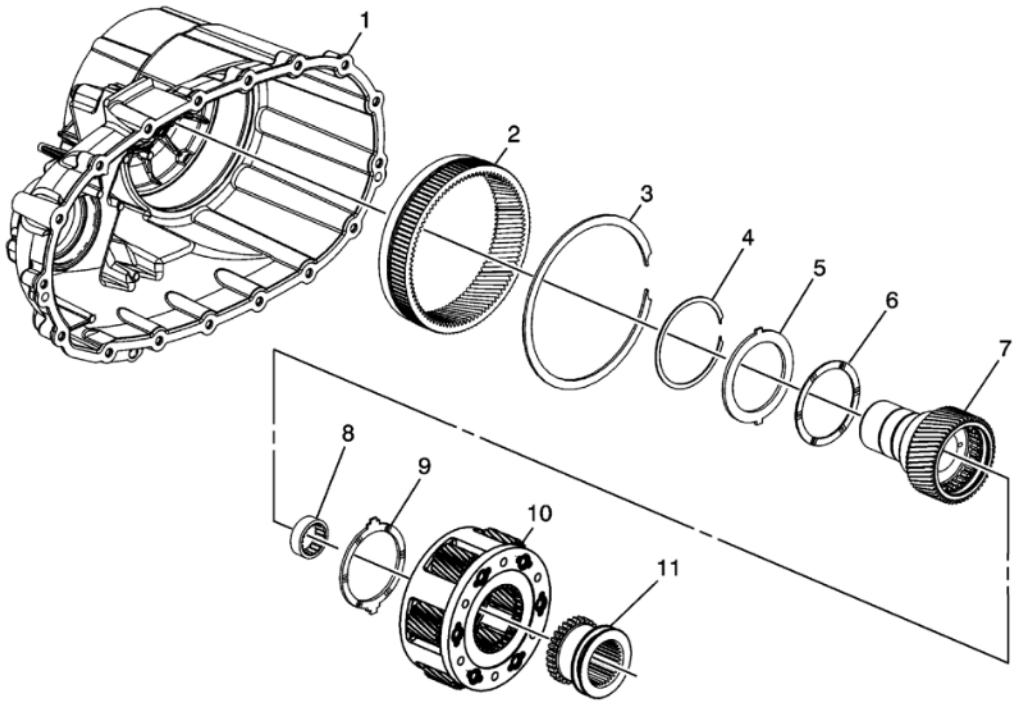



**Fig. 87: NQF/NQG/NQH -- Second Design**
**Courtesy of GENERAL MOTORS COMPANY**

| Magna Heavy Duty NQF/NQG/NQH - Second Design | | | |
|---|---|---|---|
| **Callout** | **Description** | **GM PN** | **Service Usage** |
| 1 | Front Case Half Assembly w/gear (2) and ring (3) | 19299079 | 2011-13 NQF |
| 1 | Front Case Half Assembly w/gear (2) and ring (3) | 19299078 | 2007-10 NQG |
| 1 | Front Case Half Assembly w/gear (2) and ring (3) | 19299080 | 2011-13 NQG |
| 1 | Front Case Half Assembly w/gear (2) and ring (3) | 19299077 | 2007-13 NQH |
| 2 | High/Low Internal Gear-Not serviceable-part of case assembly | NO/PN | NQF/NQG/NQH |
| 3 | High/Low Internal Gear Retaining Ring | 14037953 | NQF/NQG/NQH |
| 4 | High/Low Planetary Carrier Retaining Ring | 15547397 | NQF/NQG/NQH |
| 5 | High/Low Locking Plate-Two tab design | 15664905 | NQF/NQG/NQH |
| 6 | Thrust Washer-No tab design - Front | 12470959 | NQF/NQGF/NQH |
| 7 | Input Shaft Assembly-w/pilot bearing | 19299086 | NQH w/MYD |
| | | | 07-10MY NQG w/MYD and MW7 |
| 7 | Input Shaft Assembly-w/pilot bearing | 19299087 | 2011-13 NQF/NQG w/MYD |

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| Magna Heavy Duty NQF/NQG/NQH - Second Design | | | |
|---|---|---|---|
| **Callout** | **Description** | **GM PN** | **Service Usage** |
| 7 | Input Shaft Assembly-w/pilot bearing | 19299089 | 2011-13 NQF/NQG w/MW7 |
| 8 | Pilot Bearing | 19259040 | 2011-13MY NQF/NQG w/MW7 |
| 8 | Pilot Bearing | 19132984 | 2007-10MY NQF/NQG/NQH - w/ MW7 / MYD |
| | | | 2007-13 NQH w/MYD |
| | | | 2011-13 NQF/NQG w/ MYD |
| 9 | Thrust Washer-Two tab design-Rear | 15547390 | NQG/NQH |
| | | | 2011-13 NQF |
| 10 | High/Low Planetary Carrier Assembly-Six pinion design | 19299091 | NQG/NQH |
| | | | 2011-13 NQF |
| 11 | High/Low Clutch | 19299093 | NQG/NQH |
| | | | 2011-13 NQF |

**Front Case Half Identification**

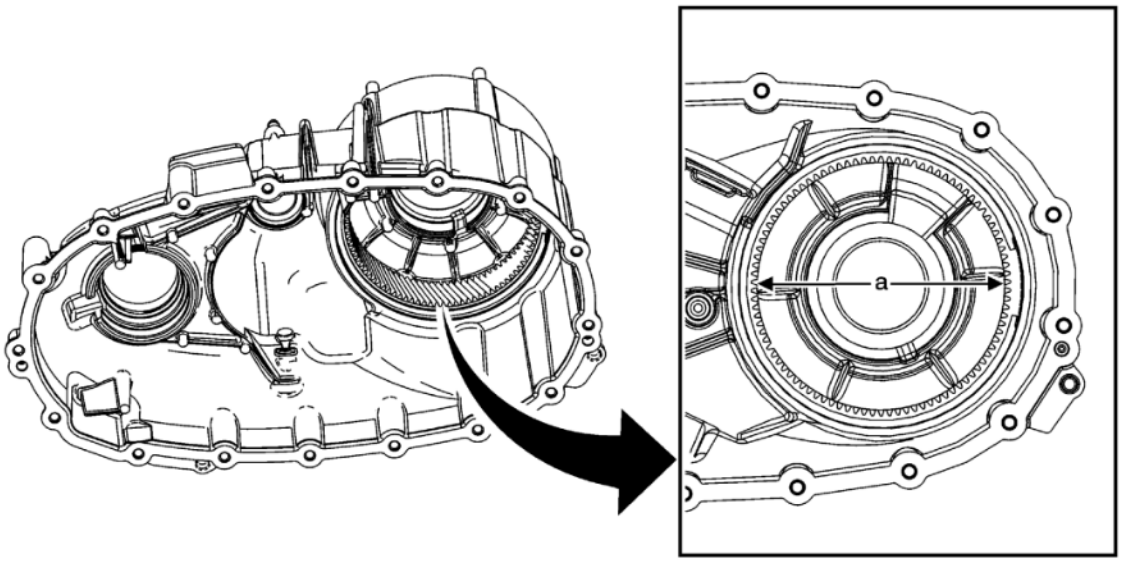



**Fig. 88: Front Case Half**
**Courtesy of GENERAL MOTORS COMPANY**

The first design front case half assembly can be identified as having an internal gear that is a 94 tooth design with an inside diameter (a) of 148.5 mm (5.85 in).

The second design front case half assembly can be identified as having an internal gear that is a 91 tooth design with an inside diameter (a) of 142 mm (5.59 in).

**Input Shaft Identification**

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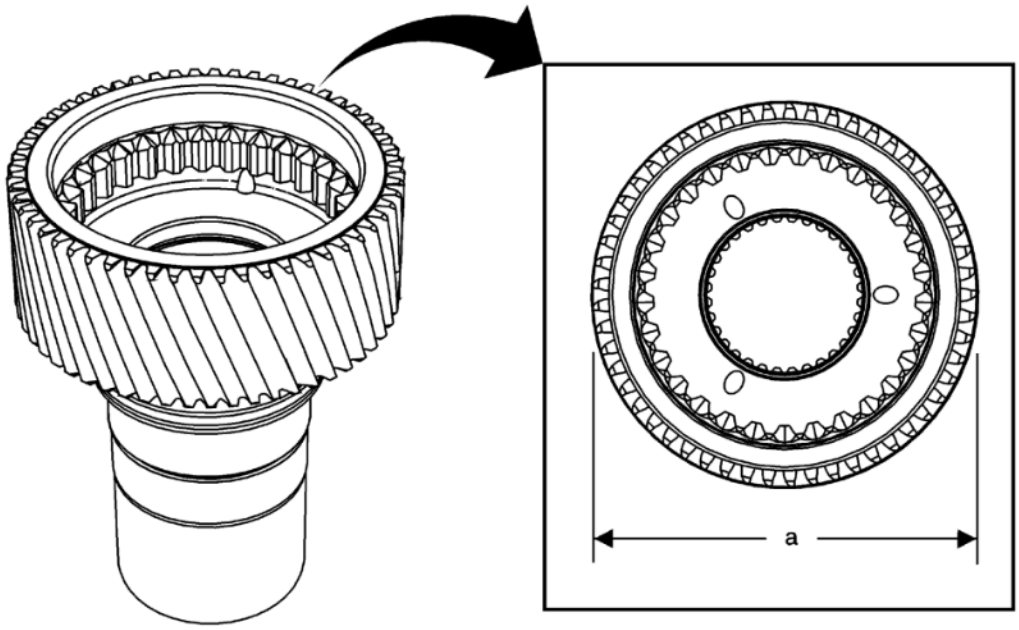
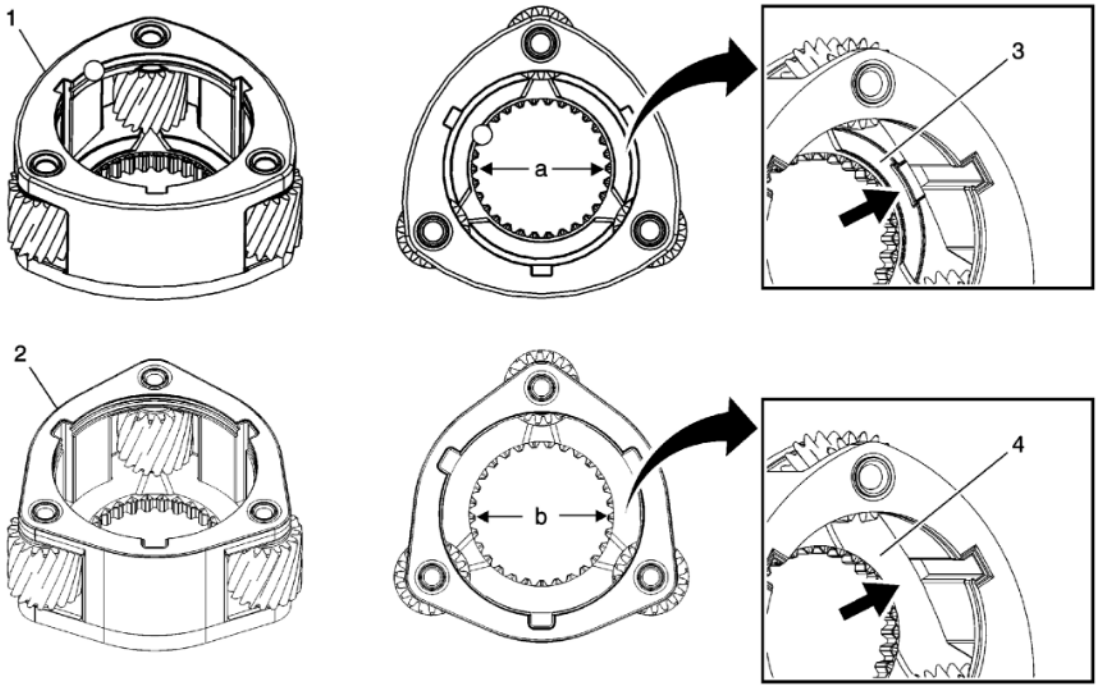



**Fig. 89: Input Shaft**
**Courtesy of GENERAL MOTORS COMPANY**

The first design input shaft can be identified as a 56 tooth design with an outside diameter (a) of 91.4 mm (3.60 in) and two oil drain holes 180 degrees apart.

The second design input shaft can be identified as a 53 tooth design with an outside diameter (a) of 87.50 mm (3.44 in) and three oil drain holes 120 degrees apart.

### High/Low Planetary Carrier Assembly Identification




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**Fig. 90: Light-Duty 3-Pinion High/Low Planetary Carrier**
**Courtesy of GENERAL MOTORS COMPANY**

The first-design light-duty 3-pinion high/low planetary carrier (1) can be identified as having a 30 tooth design with an inside diameter (a) of 61.3 mm (2.41 in). In addition, the first-design carrier can also be identified by the presence of a recessed washer pocket (3) at the rear thrust washer location.

The second-design light-duty 3-pinion high/low planetary carrier (2) can be identified as having a 29 tooth design with an inside diameter (b) of 60.2 mm (2.37 in). In addition, the second-design carrier can also be identified by the lack of a recessed washer pocket (4) at the rear thrust washer location.

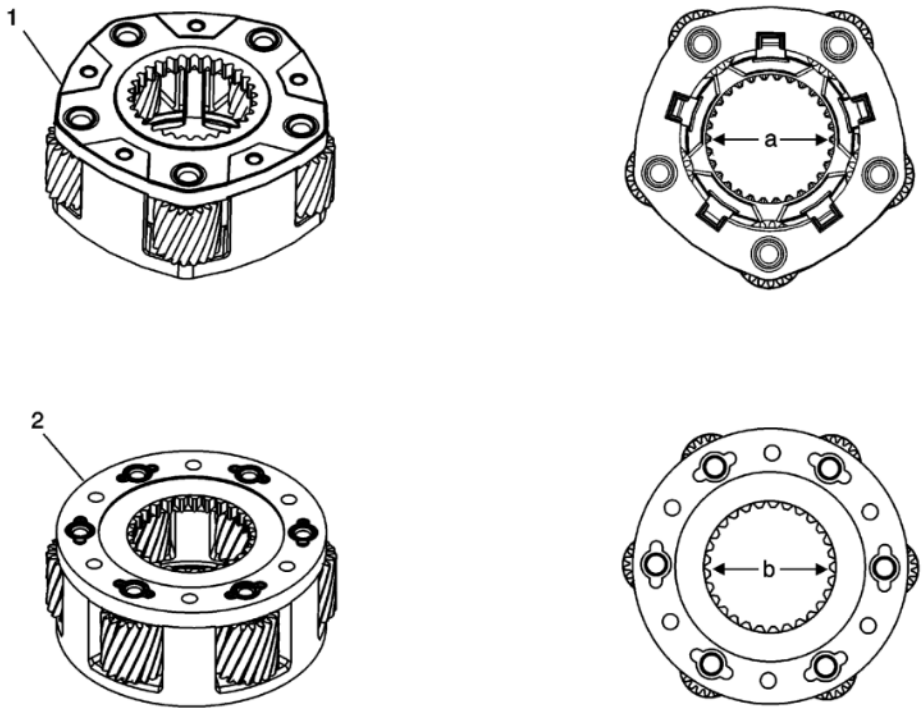



**Fig. 91: Heavy-Duty 5-Pinion High/Low Planetary Carrier**
**Courtesy of GENERAL MOTORS COMPANY**

The first-design heavy-duty 5-pinion high/low planetary carrier (1) can be identified as having 5 pinions and a 30 tooth design with an inside diameter (a) of 61.3 mm (2.41 in).

The second-design heavy-duty 6-pinion high/low planetary carrier (2) can be identified as having 6 pinions and a 29 tooth design with an inside diameter (b) of 60.2 mm (2.37 in).

**High/Low Clutch**

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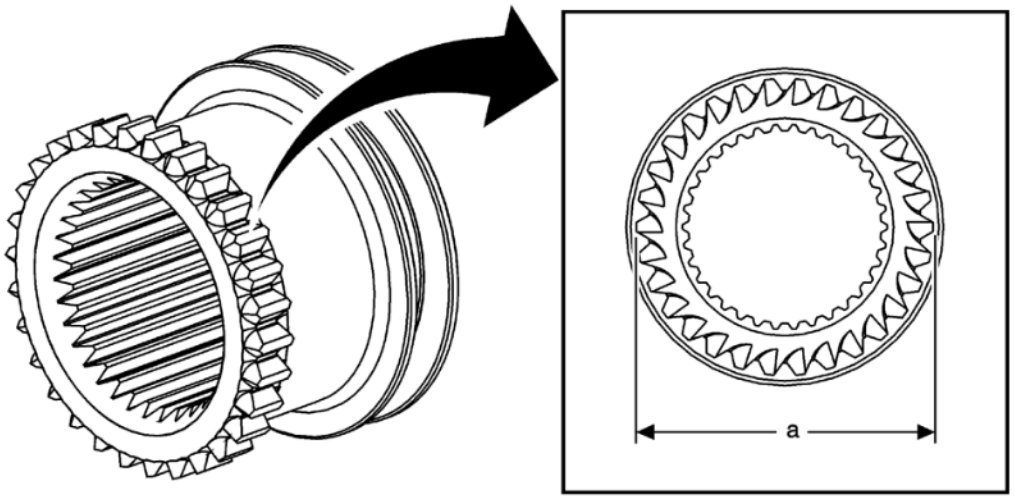
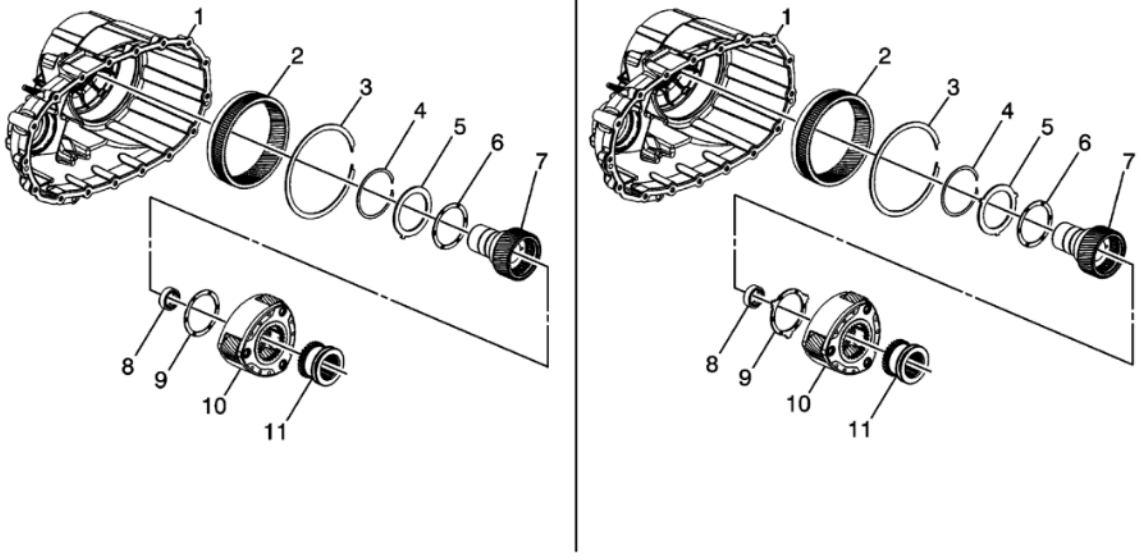



**Fig. 92: High/Low Clutch**
**Courtesy of GENERAL MOTORS COMPANY**

The first design high/low clutch can be identified as having a 30 tooth design with a gear tooth outside diameter (a) of 65.50 mm (2.58 in).

The second design high/low clutch can be identified as having a 29 tooth design with a gear tooth outside diameter (a) of 63.25 mm (2.49 in).

**Component Replacement - Light Duty Conversion from First Design to Second Design**




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**Fig. 93: Light Duty Conversion from First Design to Second Design**
**Courtesy of GENERAL MOTORS COMPANY**

It is possible to repair a first-design assembly using second-design components. Refer to the parts catalog and the Parts Identification Tables above for component part number clarification.

When servicing a first-design LD assembly with LD second-design components, the following components MUST be replaced as a group:

1. Front Case Half Assembly - with internal gear and retaining ring
2. Locking Plate
3. Thrust Washer (front)
4. Input Shaft
5. Pilot Bearing
6. Thrust Washer (rear)
7. Planetary Carrier Assembly
8. High/Low Clutch
9. Thrust Washer
10. High/Low Planetary Carrier Assembly
11. High/Low Clutch

**Component Replacement - Heavy Duty Conversion from First Design to Second Design**

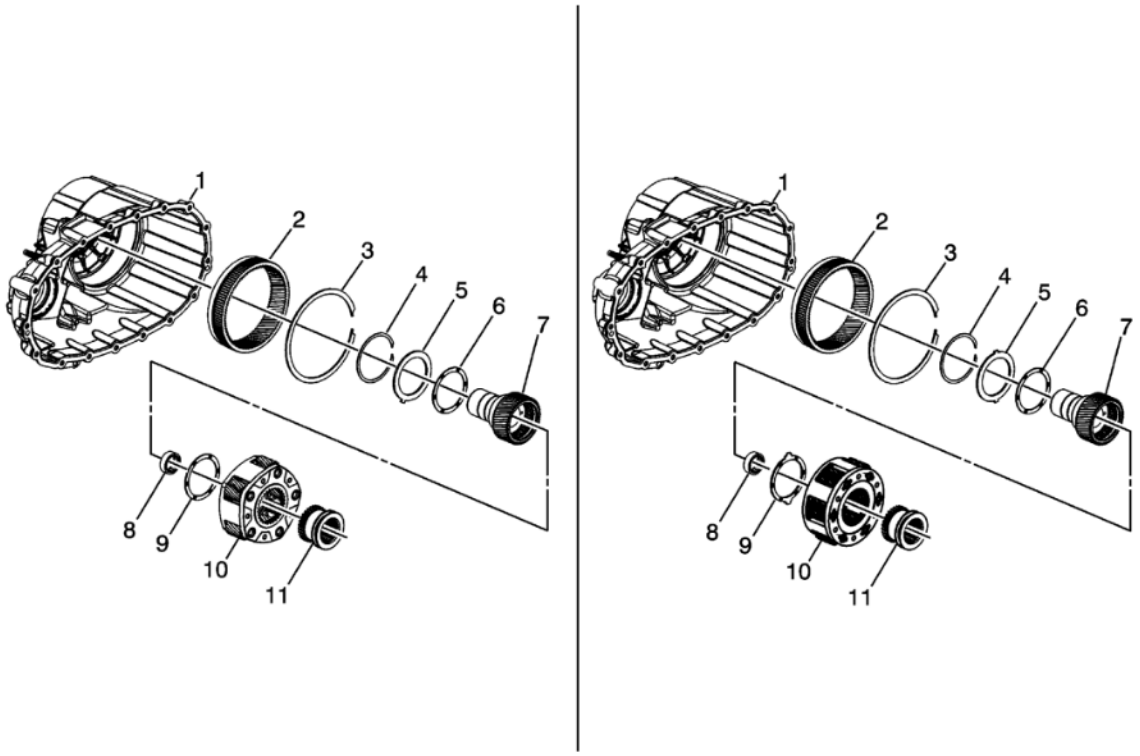



**Fig. 94: Heavy Duty Conversion from First Design to Second Design**
**Courtesy of GENERAL MOTORS COMPANY**

It is possible to repair a first-design HD assembly using second-design HD components. Refer to the parts catalog and the Parts Identification Tables above for component part number clarification.

When servicing a first-design HD assembly with HD second-design components, the following components MUST

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be replaced as a group:

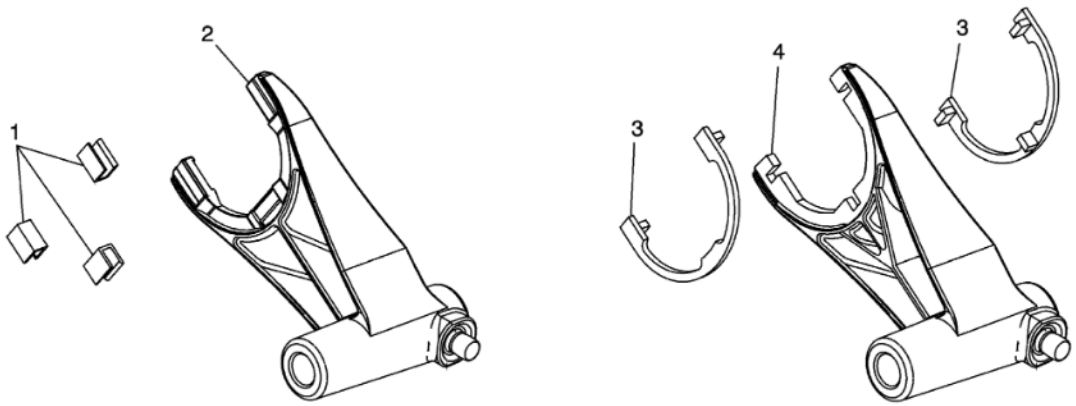
1. Front Case Half Assembly - with internal gear and retaining ring
2. Locking Plate
3. Thrust Washer (front)
4. Input Shaft
5. Pilot Bearing
6. Thrust Washer (rear)
7. Planetary Carrier Assembly
8. High/Low Clutch
9. Thrust Washer
10. High/Low Planetary Carrier Assembly
11. High/Low Clutch

**Production Changes Summary**

For production the following transfer cases variations were produced:

- 2007-12i Magna LD NQG/NQH - produced with first-design content. First design service components are available. A second-design assembly may be used for back-service in a first-design application.
- 2007-10 Magna HD NQF - produced with only first-design content. Service components are available.
- 2007-10 Magna HD NQG - produced with only first-design content. Service assemblies may contain either first or second design content. Both first and second design service components are available.
- 2007-12i Magna HD NQH - produced with first-design content. First design service components are available. A second-design assembly may be used for back-service in a first-design application.
- 2011-12i Magna SHD NQF/NQG - produced with first design content. First design service components are available. A second-design assembly may be used for back-service in a first-design application.
- 2012i-13 Magna LD NQG/NQH - produced with second-design content. Second design service components are available.
- 2012i-13 Magna HD NQH - produced with second-design content. Second design service components are available
- 2012i-13 Magna SHD NQF/NQG - produced with second-design content. Second design service components are available

**2012 Interim Model Year Design Change - NQG High/Low Shift Fork, Fork Pad, and High/Low Clutch**




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**Fig. 95: High/Low Shift Fork, Fork Pad And High/Low Clutch**
**Courtesy of GENERAL MOTORS COMPANY**

Interim 2012 model year the High/Low shift fork, fork pad, and High/Low clutch design changed. The first design forks (2) can be identified as having three flat un-notched fork pad areas with three separate fork pads (1). The second design forks (4) can be identified as having a half-round shaped pad area with three notches for pad orientation and installation and upper and lower half-round fork pads (3). The second design shift fork (4) and pads (3) are the only design available for service and must be used with the second design High/Low clutch.

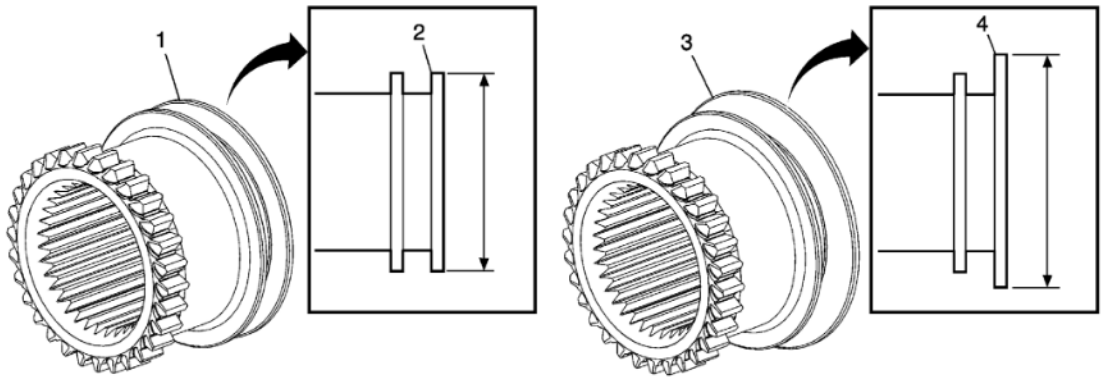



**Fig. 96: OD Rear Flange**
**Courtesy of GENERAL MOTORS COMPANY**

Interim 2012 model year the High/Low shift fork, fork pad, and High/Low clutch design changed. The first design high/low clutch (1) can be identified by having a 73 mm (2.87 in) OD rear flange (2). The second design high/low clutch (3) can be identified by having a 76 mm (2.99 in) OD rear flange (4).

For service:

- The first design 73 mm (2.87in) high/low clutch may NOT be used with the second design fork and pad.
- The second design 76 mm (2.99in) high/low clutch must be used with the second design fork and fork pad.
- The second design 76 mm (2.99in) high/low clutch may also be used with the first design fork and pad if first design fork replacement is not required.

**2011 Interim Model Year Design Change - NQF/NQG HD and SHD Design Change - Main shaft, pin, and thrust washer**

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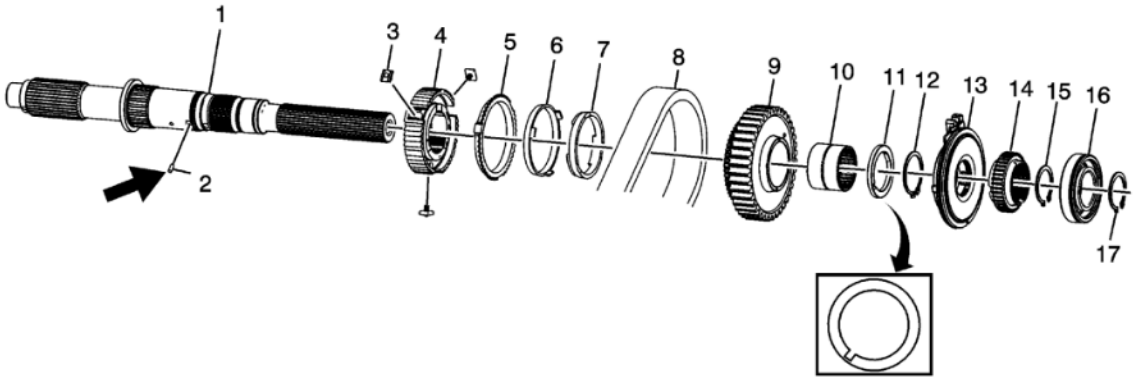



**Fig. 97: NQF/NQG HD And SHD Design Change - Main Shaft, Pin, And Thrust Washer**
**Courtesy of GENERAL MOTORS COMPANY**

Beginning in 2011 model year for NQF / NQG HD and SHD applications, an anti-rotation main-shaft pin (2) was added to the design as well as a design change to thrust washer (11). The new design is to prohibit the rotation of the thrust washer (11). Components of this design are not to be used for back service.

### 2011 Interim Model Year Design Change - NQF/NQG/NQH/NPO Front Output Shaft, Deflector, Seal

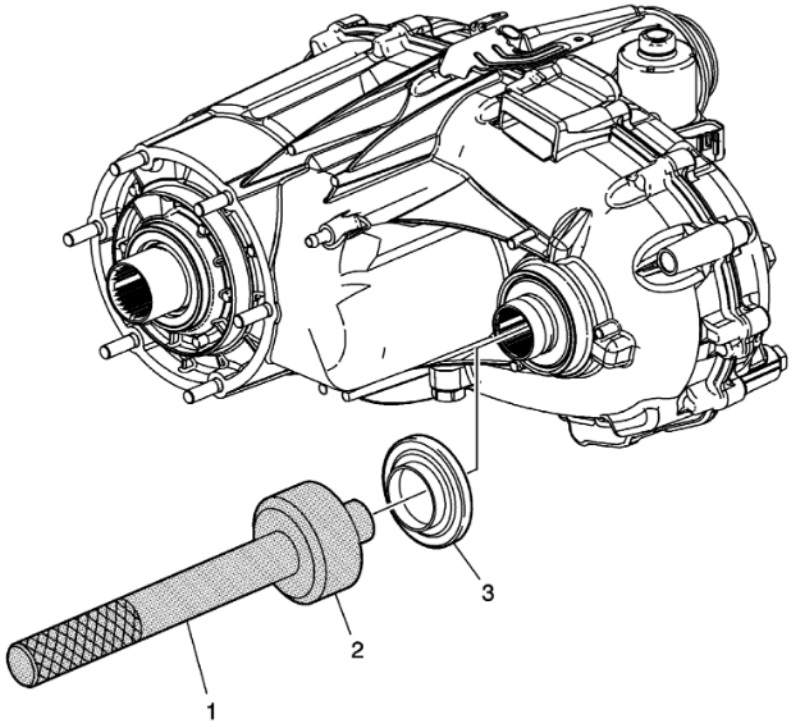



**Fig. 98: Front Output Shaft Slinger And Special Tools**

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**Courtesy of GENERAL MOTORS COMPANY**

Interim 2011 model year, a new design front output shaft deflector (3) was implemented into production for second design NQF-HD/SHD and NQG-HD applications. First design 2011 model year NQF and NQG applications can be identified as not having the deflector on the front output shaft.

For service, the new design front output shaft, deflector, and new design seal may be installed on current and prior model year Magna NQF-HD/SHD, NQG-LD/HD, NQH-LD/HD, and NP0 applications providing the new design front output shaft is also installed. The front output shaft deflector is to be installed using **GE-8092** driver handle (1) and **DT-50649** seal installer (2).

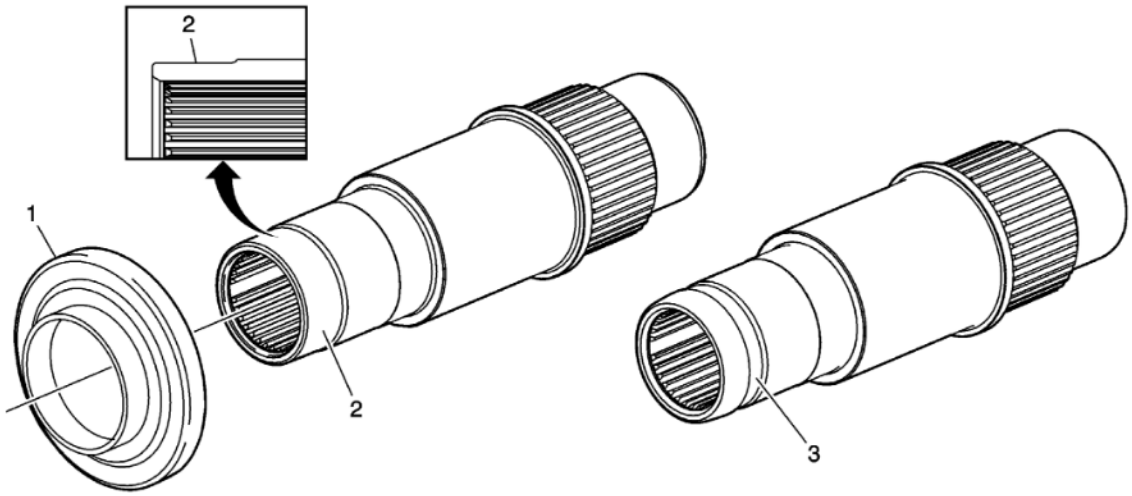



**Fig. 99: New Design Slinger**
**Courtesy of GENERAL MOTORS COMPANY**

The NEW design deflector (1) can be installed onto all current and prior model year Magna RPOs NQF, NQG, NQH, and NPO applications providing the NEW design front output shaft (2) is also installed. Second design front output shafts can be identified by the machined area on the OD output end of the shaft (2). First design front output shafts can be identified by the dust boot clamp groove located (3) at the OD output end of the shaft. The NEW design slinger will NOT install onto the first design shafts.

**2010 Service Parts Release Usage Change - NQH/NPO Control Actuator Levers**

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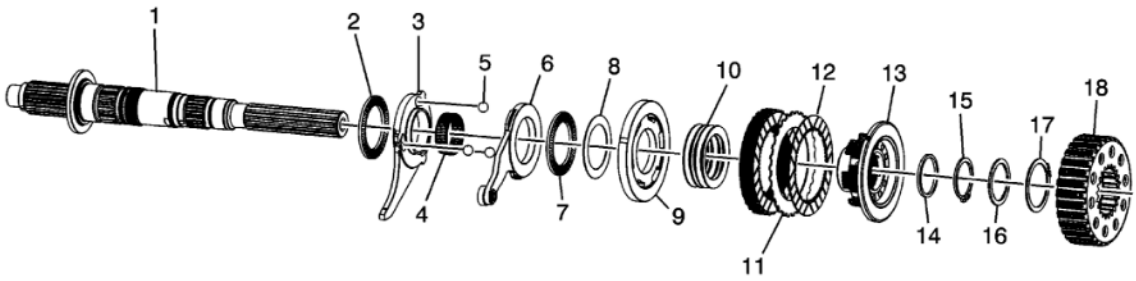



**Fig. 100: Clutch Components**
**Courtesy of GENERAL MOTORS COMPANY**

Light Duty (LD) 2007-2010 MP3023-NQH and 2010 MP3010-NP0 production transfer cases are built with LD control actuator levers (3 and 6) and are used with 13 mm (0.52 in) diameter control actuator lever balls (5)

Heavy duty (HD) 2007-10 MP3024-NQH production transfer cases are built with HD control actuator levers (3 and 6) and are used with Heavy 10 mm (0.39 in) control actuator lever balls.

When replacement of one or both of the LD control actuator levers is required, it is necessary to replace both of the levers and all three balls with the HD components as a set. It is also necessary to re-measure and adjust clutch pack clearances as required and to perform the Transfer Case High/Low Clutch Reset. Refer to Measuring/Adjusting Clutch Assembly Height in Transfer Case Assemble, Transfer Case Description and Operation and Transfer Case High/Low Clutch Reset. Heavy duty (HD) components are the only parts available for service.

**2009 Interim Model Year Design Change - NQF Two/Four Wheel Drive Actuator Cam and Shaft**

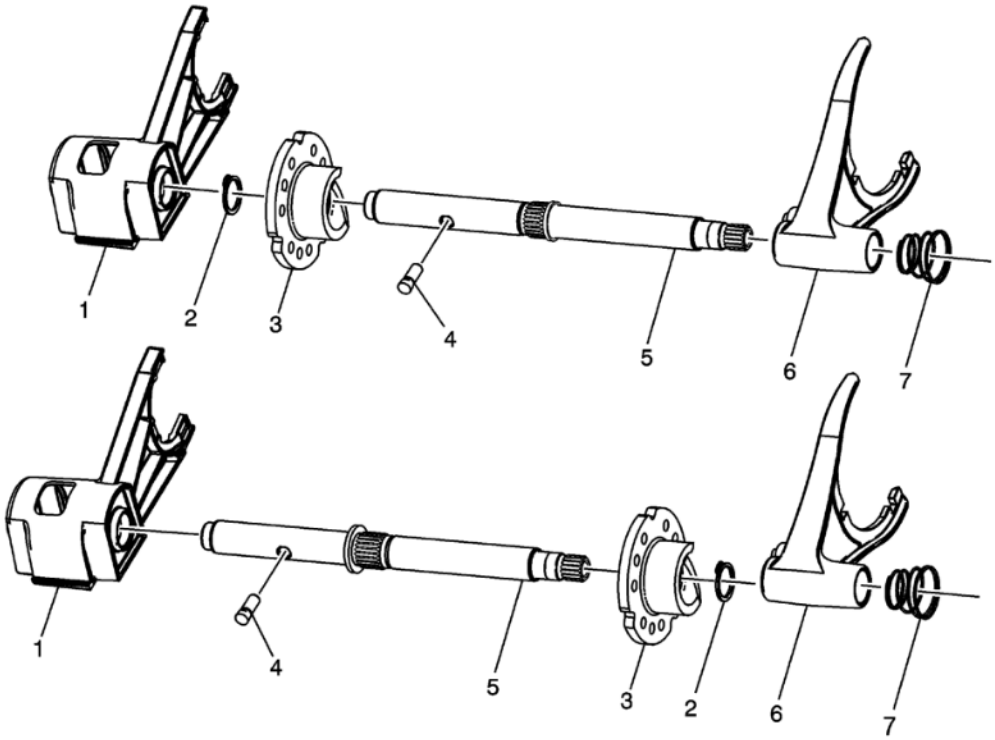



**Fig. 101: NQF Two/Four Wheel Drive Actuator Cam And Shaft (First And Second Designs)**

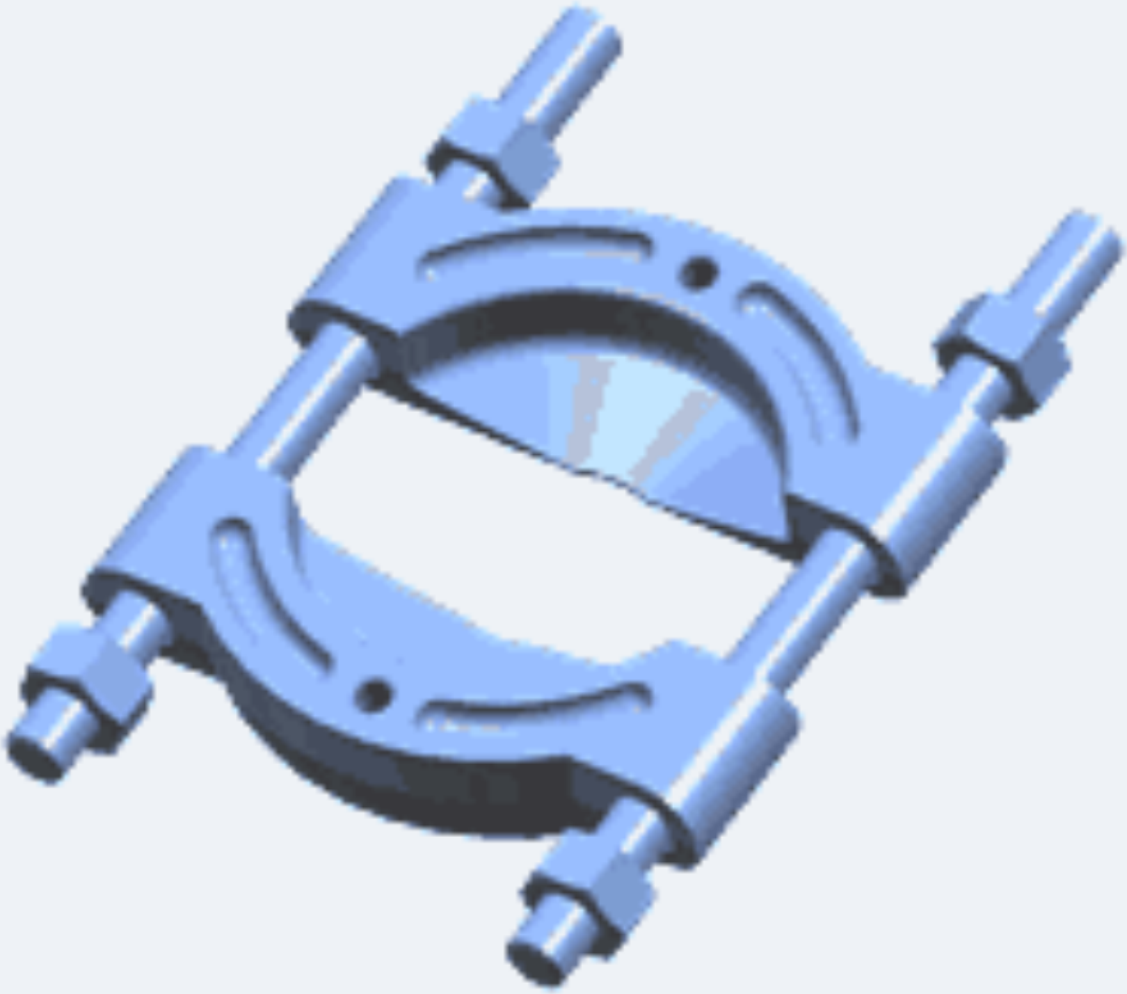
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**Courtesy of GENERAL MOTORS COMPANY**

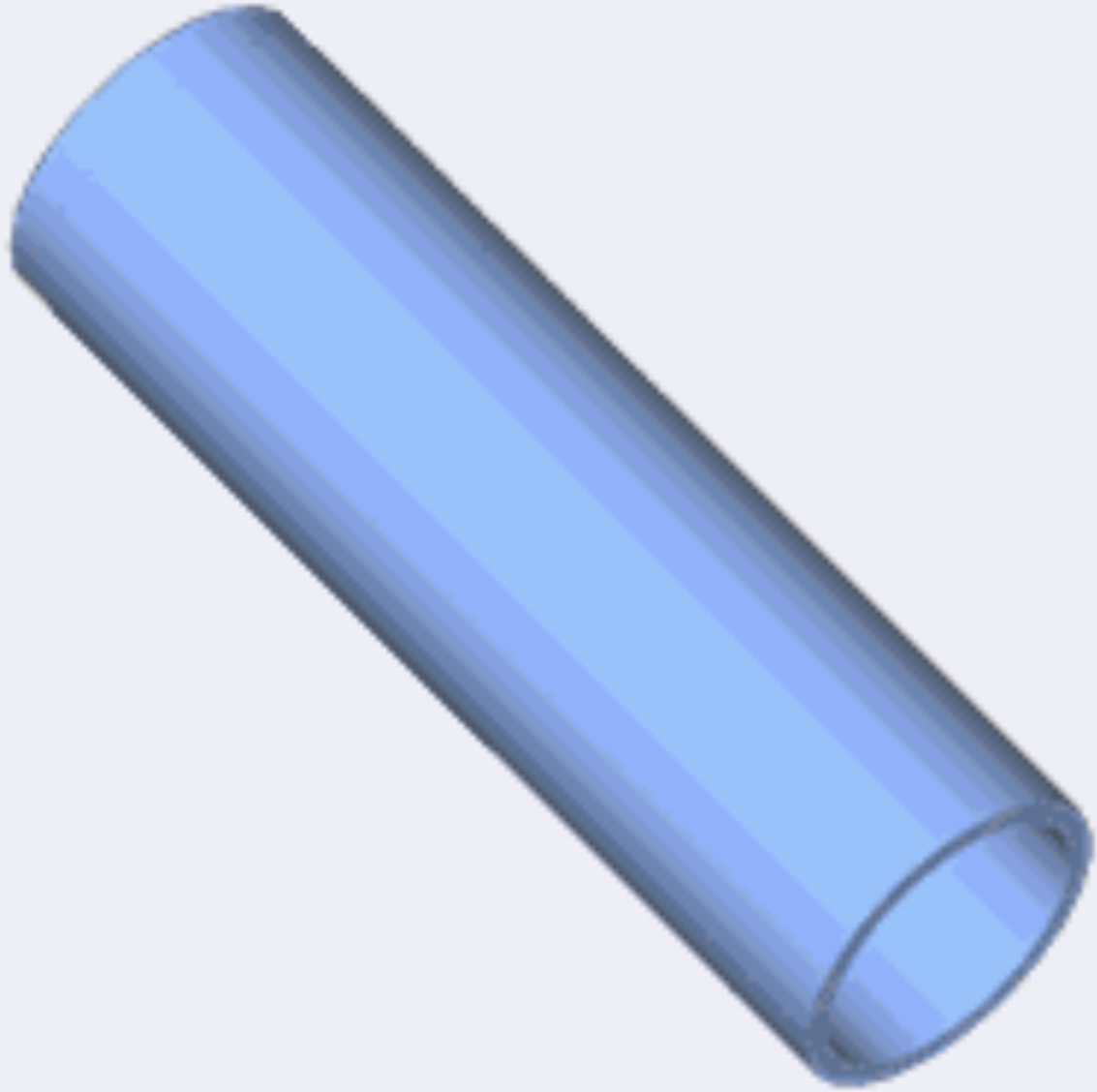
Interim 2009 model year, the high/low control actuator shaft and two/four wheel drive actuator cam designs were revised with a relocation of the shaft flange. First design 2009 transfer cases were built with first design high/low control actuator shaft (5) and cam (3). Second design 2009 transfer cases were built with second design high/low control actuator shaft (5) and cam (3). When replacing a first design control actuator shaft or cam, the second design shaft (5) and cam (3) must be installed. The second design parts are the only parts available for service.

## SPECIAL TOOLS AND EQUIPMENT

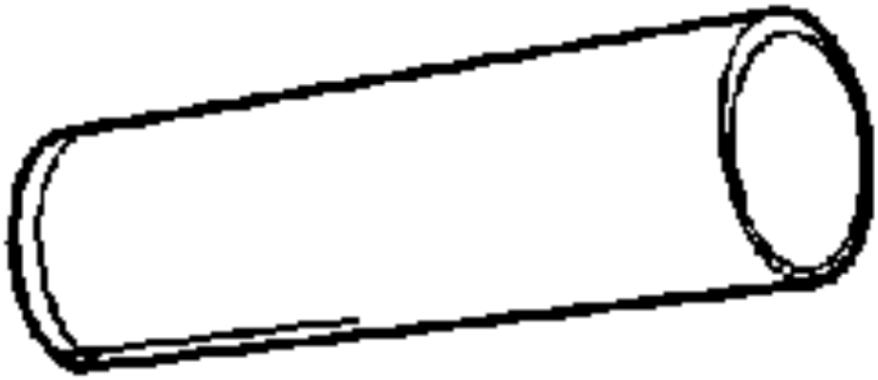
### SPECIAL TOOLS

| Illustration | Tool Number/Description |
|---|---|
|  | DT-22912-B<br>J-22912-B<br>Split Plate Bearing Puller |

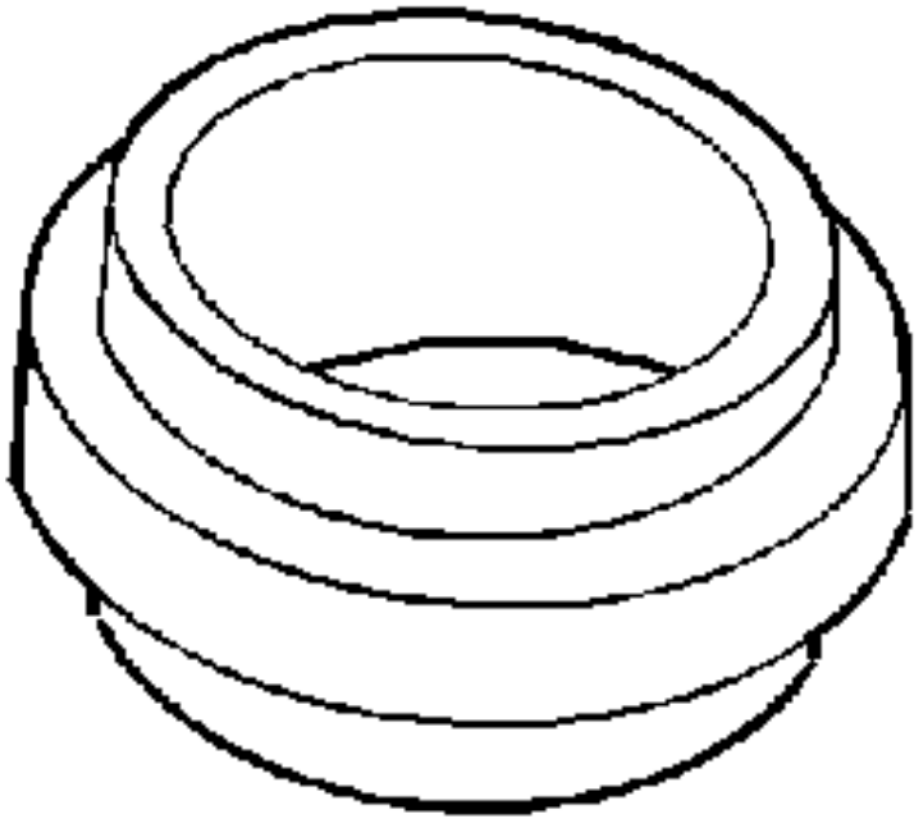
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-35512<br>J-35512<br>Inner Pinion Bearing Installer |

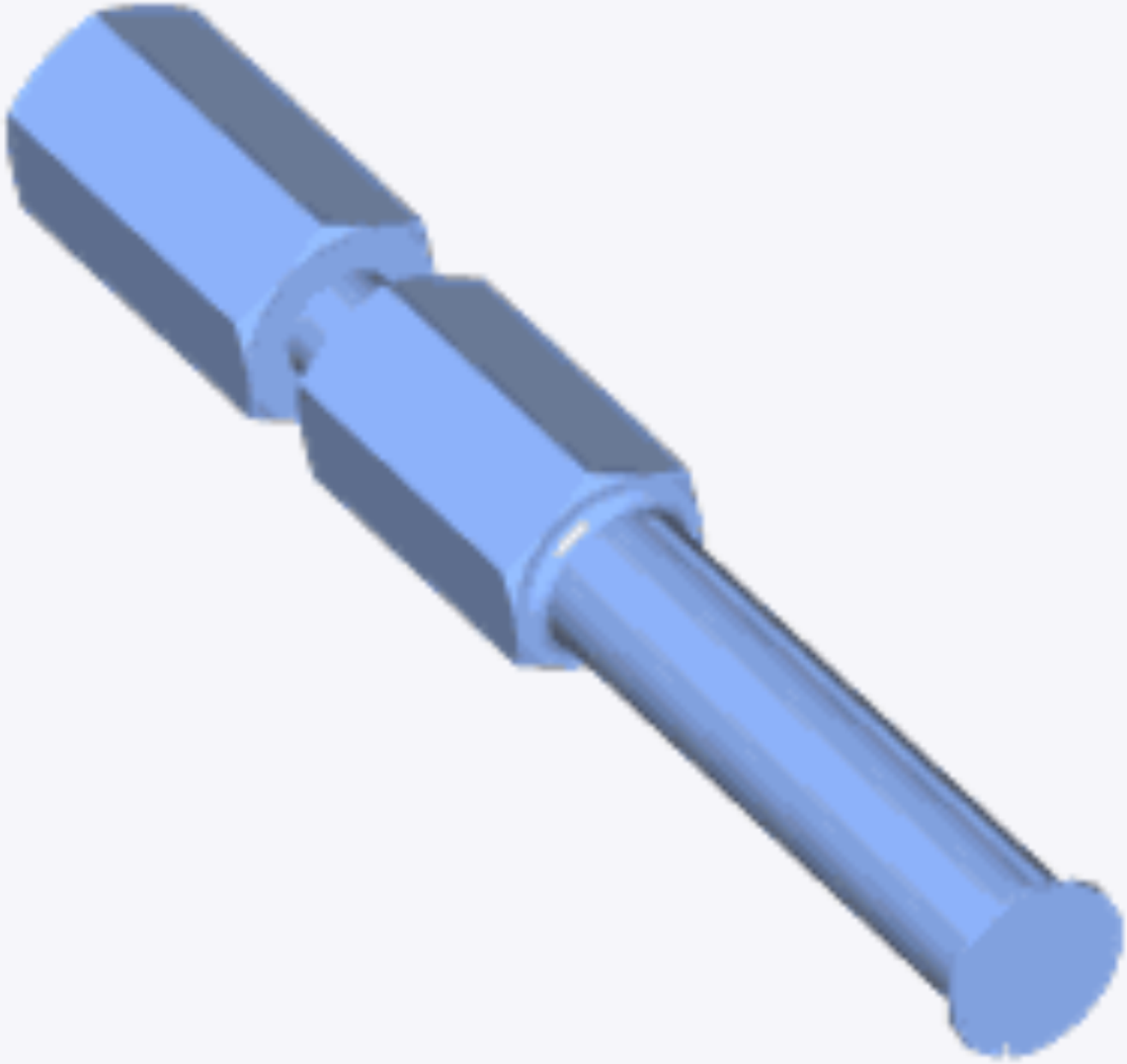
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-36183<br>J-36183<br>Press Tube |

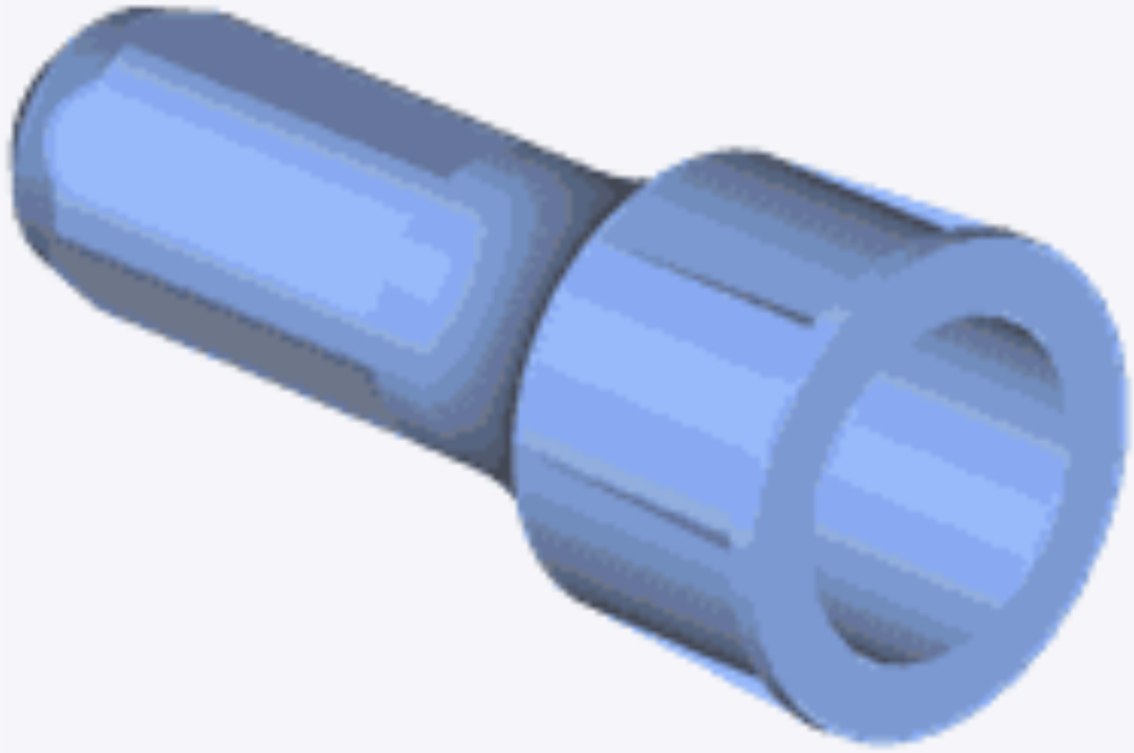
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-36184<br>J-36184<br>Press Tube Reducer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-44737<br>J-44737<br>Shift Rail Bearing Remover |

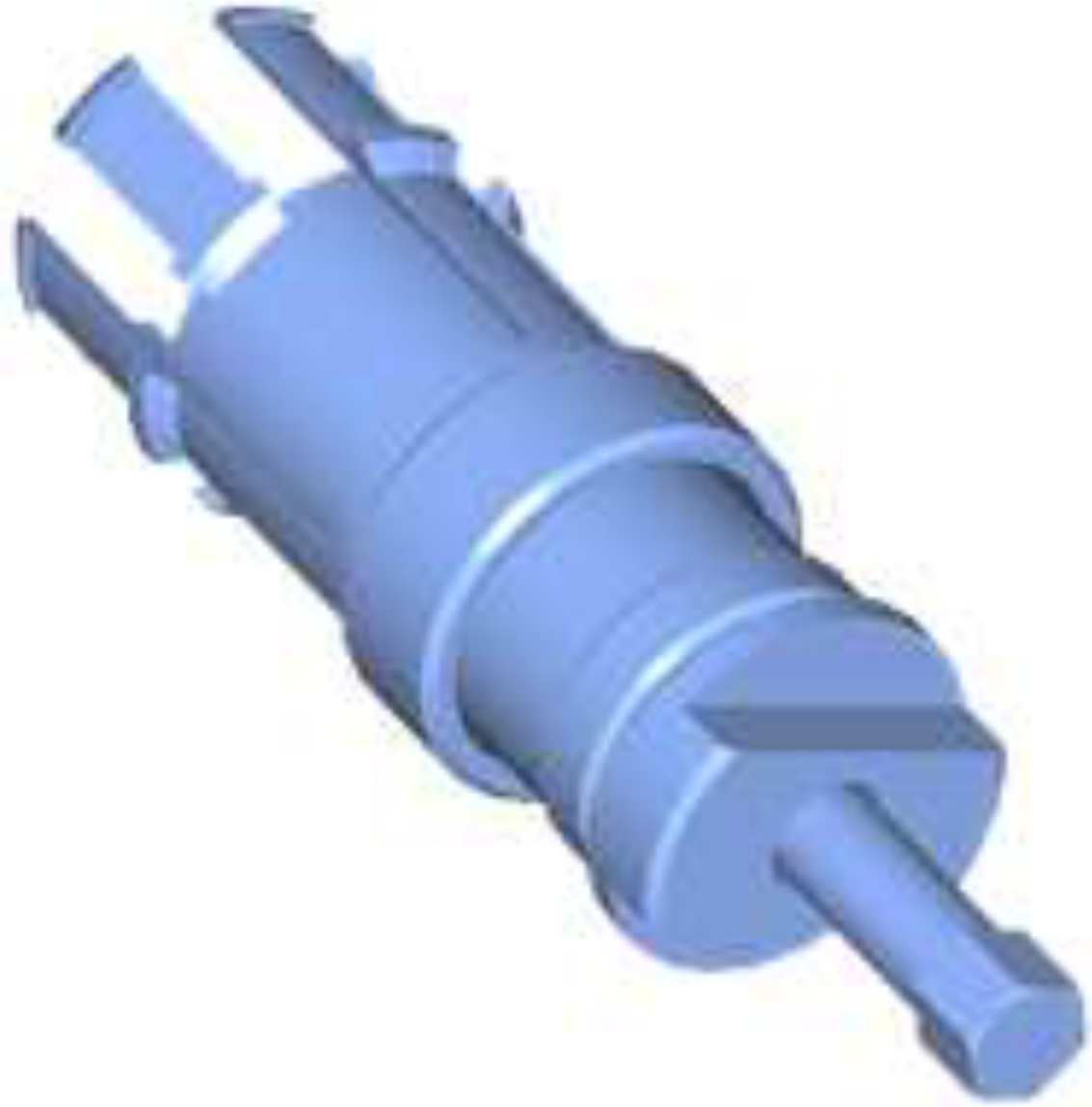
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-42738<br>J-42738<br>Seal Installer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-44907<br>J-44907<br>Bearing Installer |

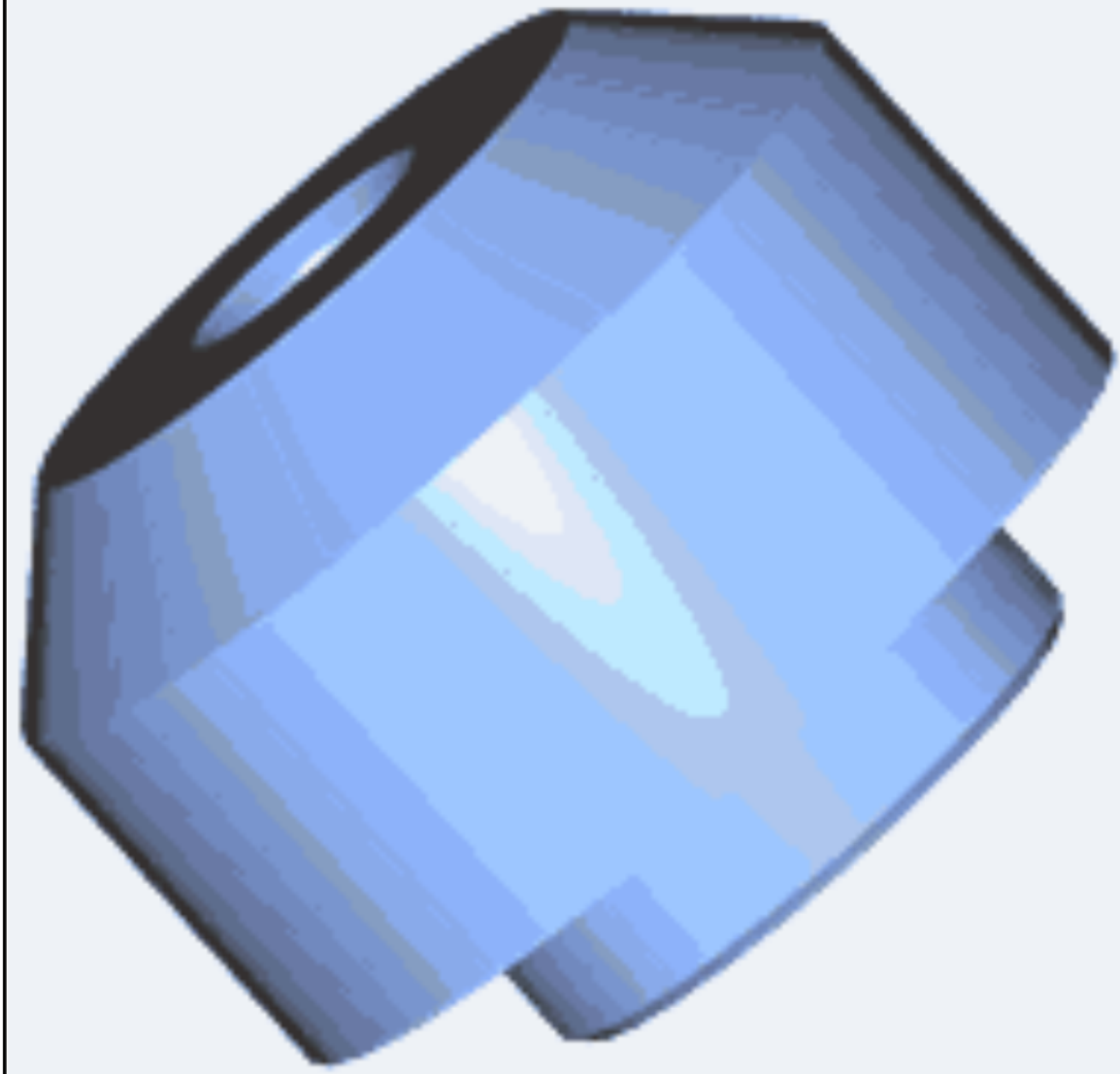
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-45380<br>J-45380<br>Transfer Case Rear Bushing Remover and Installer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-45759<br>J-45759<br>Assembly Fixture |

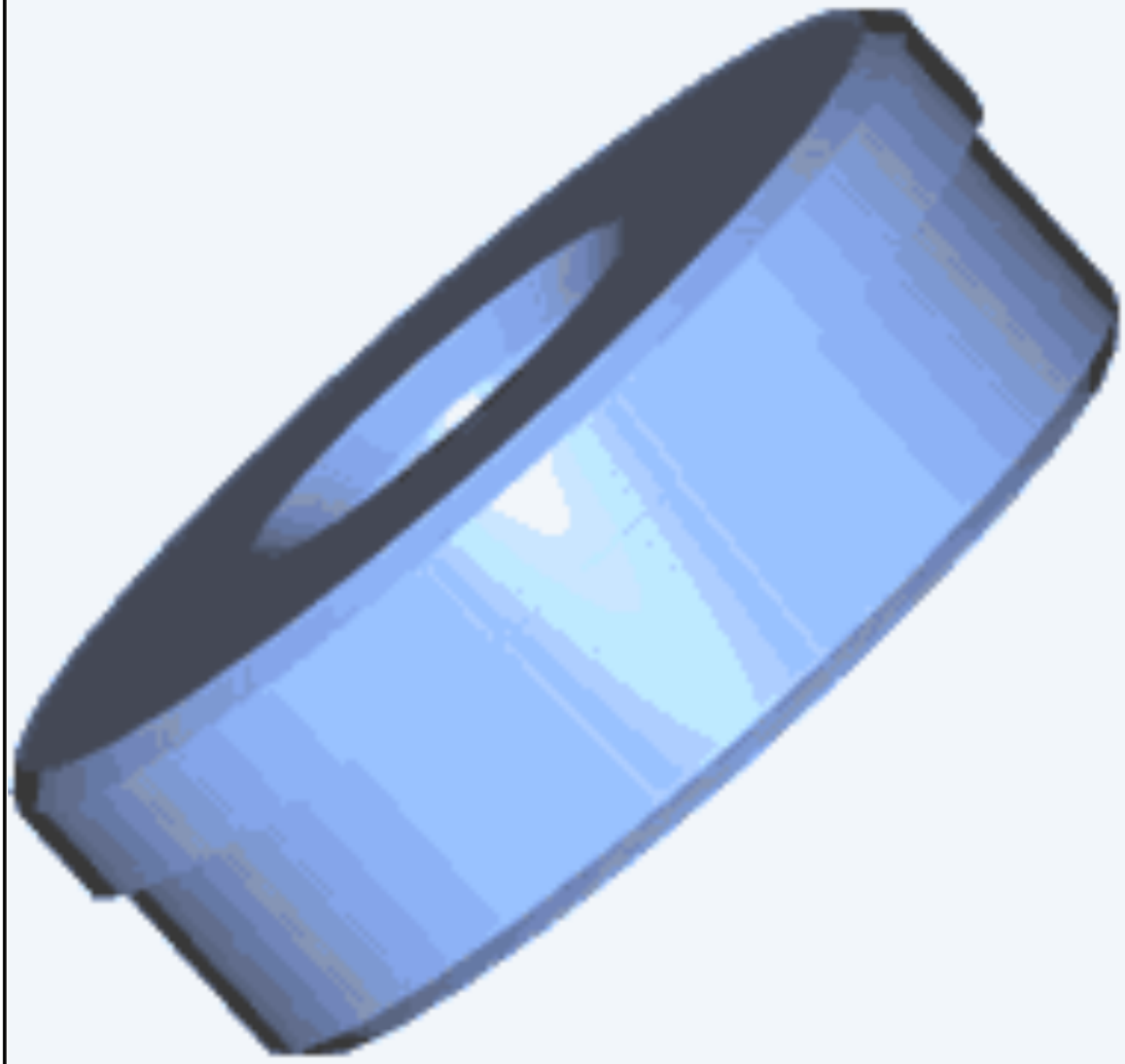
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-48021<br>Seal Installer |

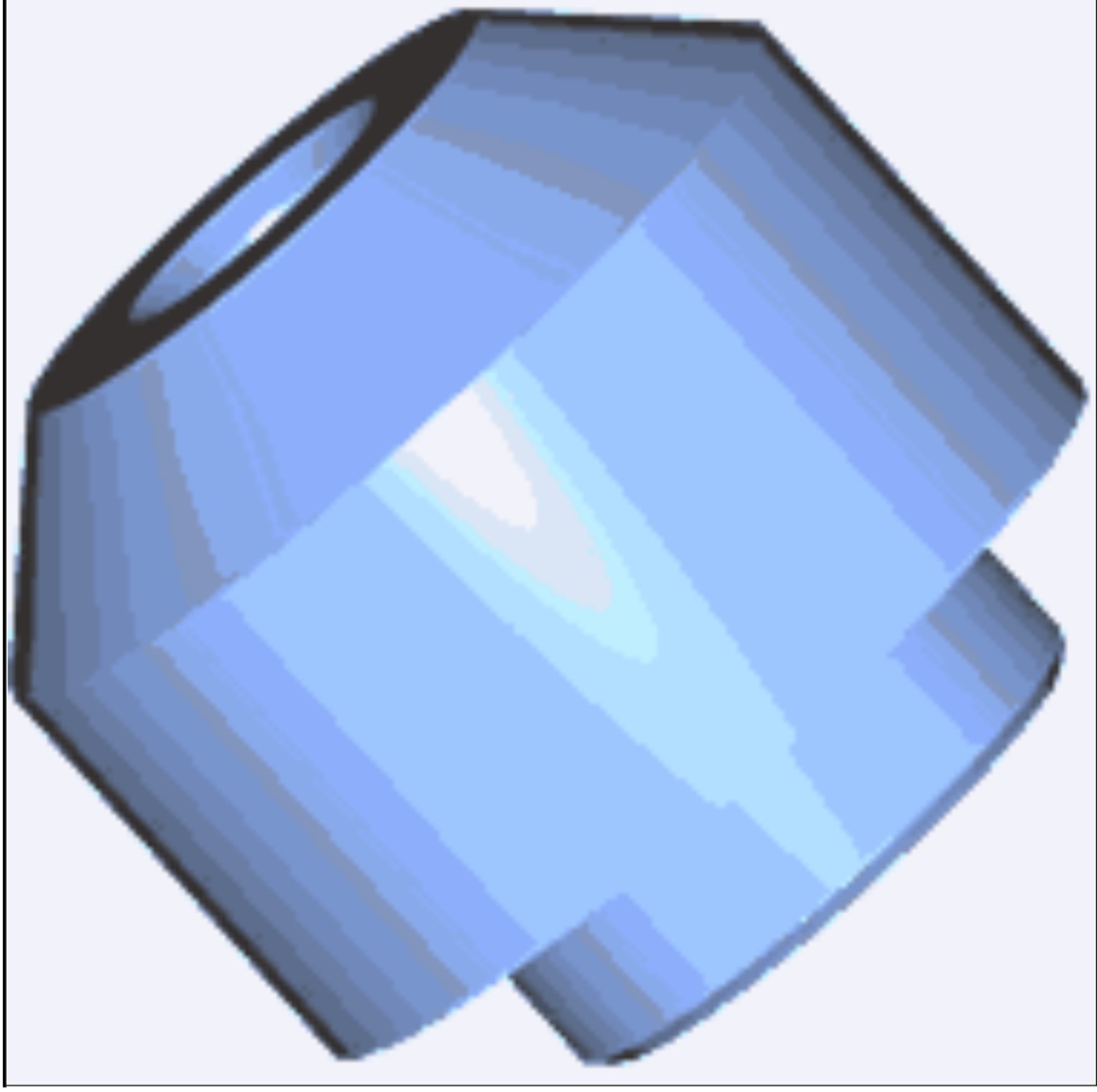
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-48022<br>Output Bushing<br>Installer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-48209<br>Bushing Remover |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-48210<br>Seal Installer |

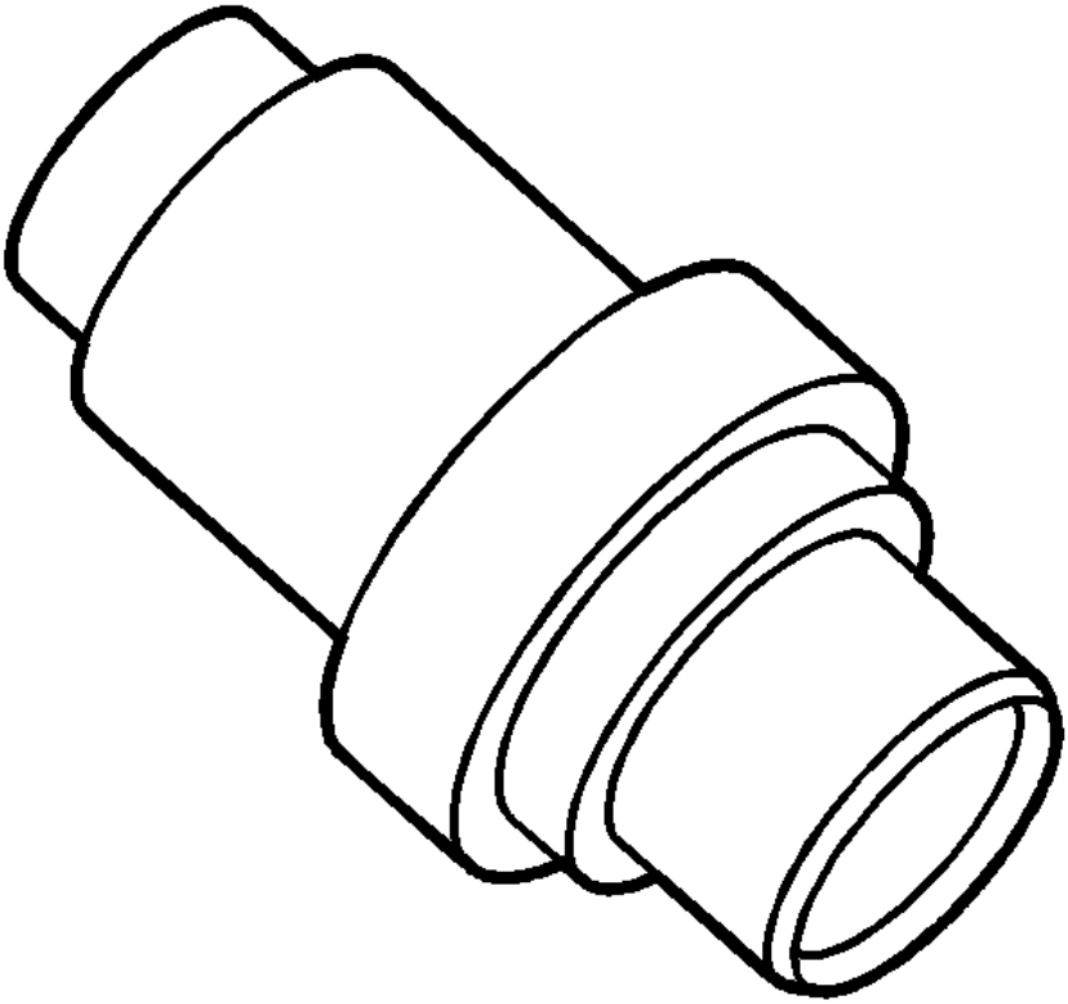
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-48211<br>Drive Sprocket<br>Bearing Installer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-48212<br>Input Shaft Pilot Bearing Installer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-48215<br>Shift Detent Lever Bearing Installer |

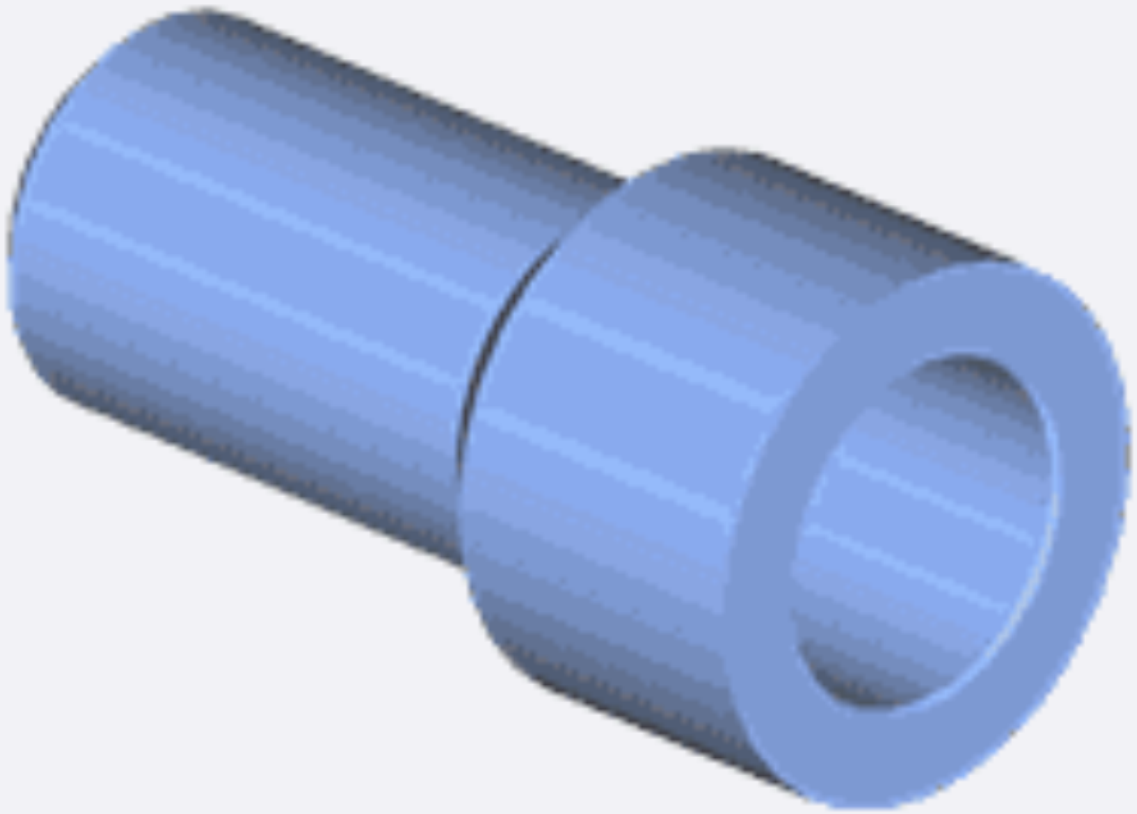
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| Illustration | Tool Number/Description |
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|  | DT-48734<br>Extension Housing<br>Bushing Replacer |

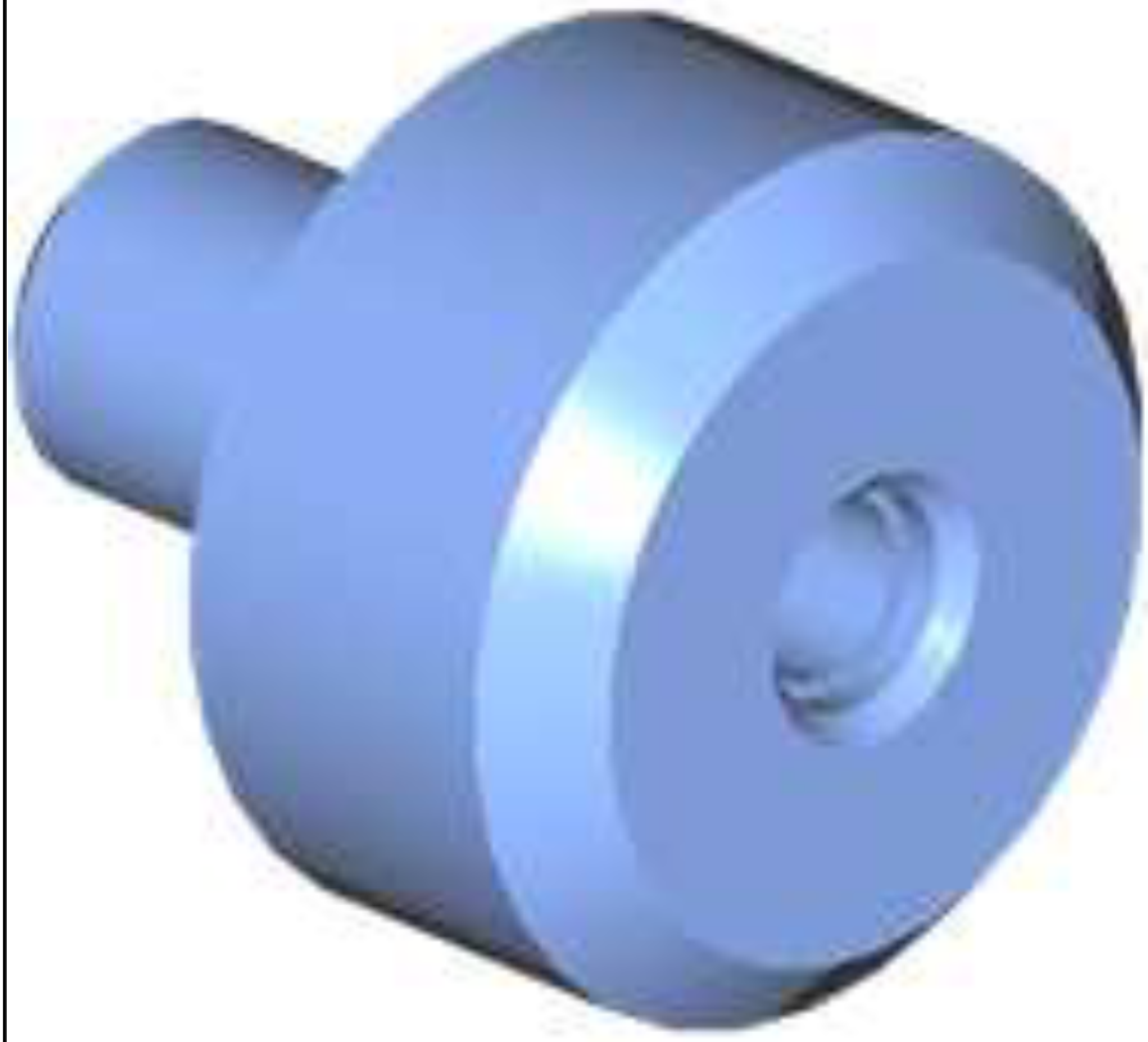
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-49299<br>Input Shaft Pilot Bearing Installer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-50648-A<br>Seal Installer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-50649<br>Seal Installer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-50802<br>Threaded Rod Kit |

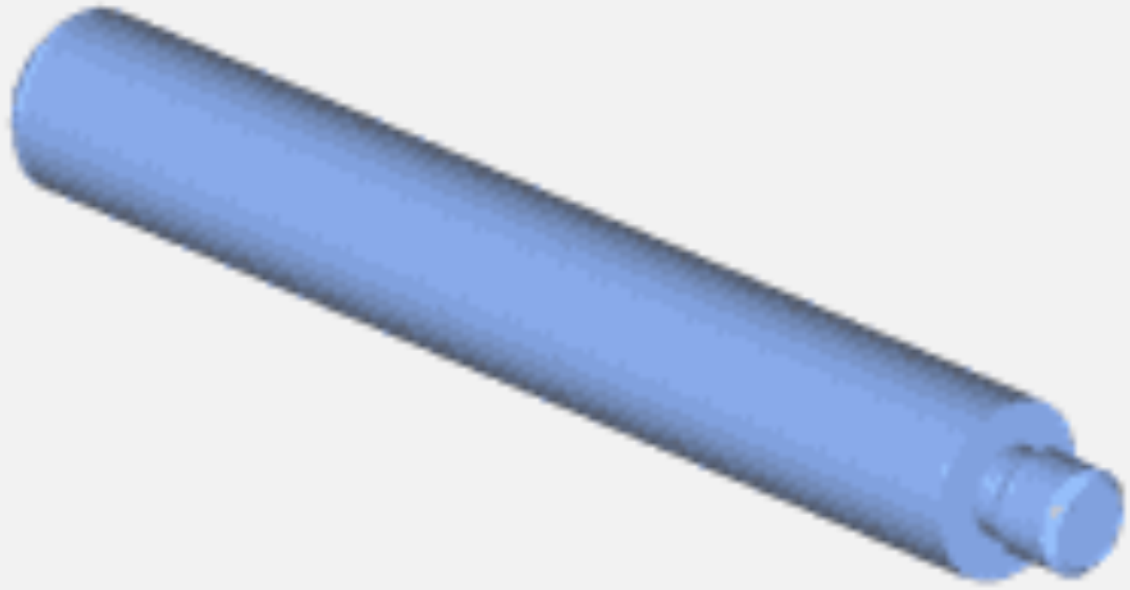
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| Illustration | Tool Number/Description |
| --- | --- |
|  | DT-51204<br>Case Separating Tool |

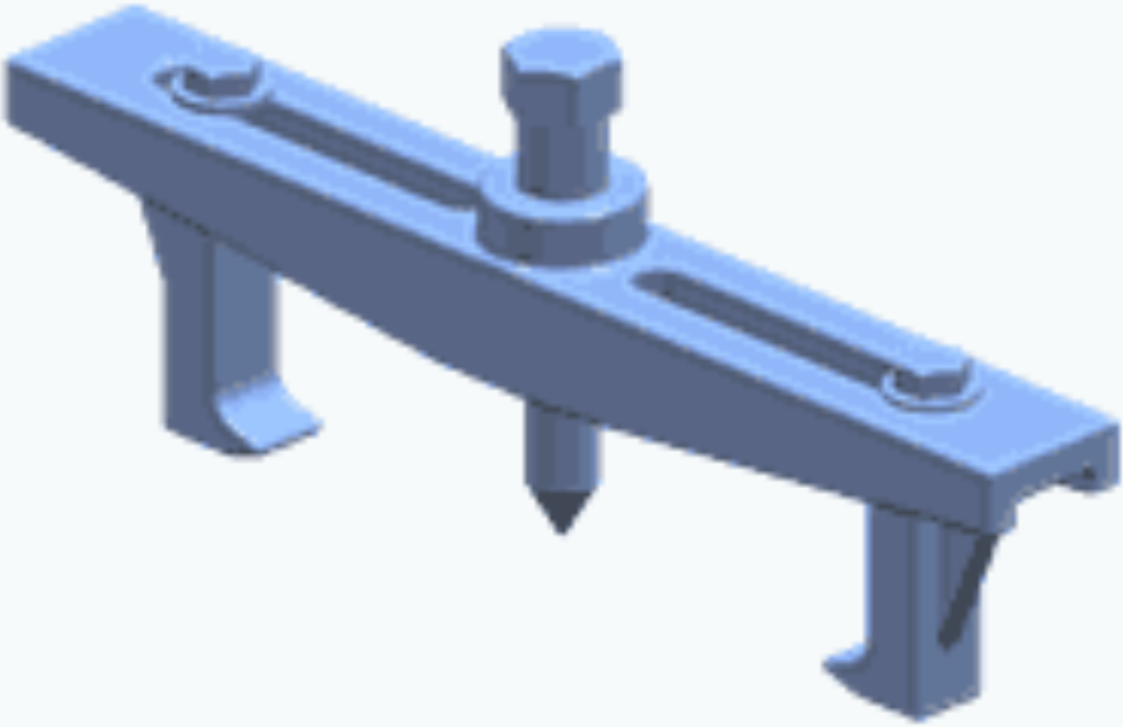
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| Illustration | Tool Number/Description |
| --- | --- |
|  | GE-7079-2<br>J-7079-2<br>Universal Driver Handle - Non-Threaded |

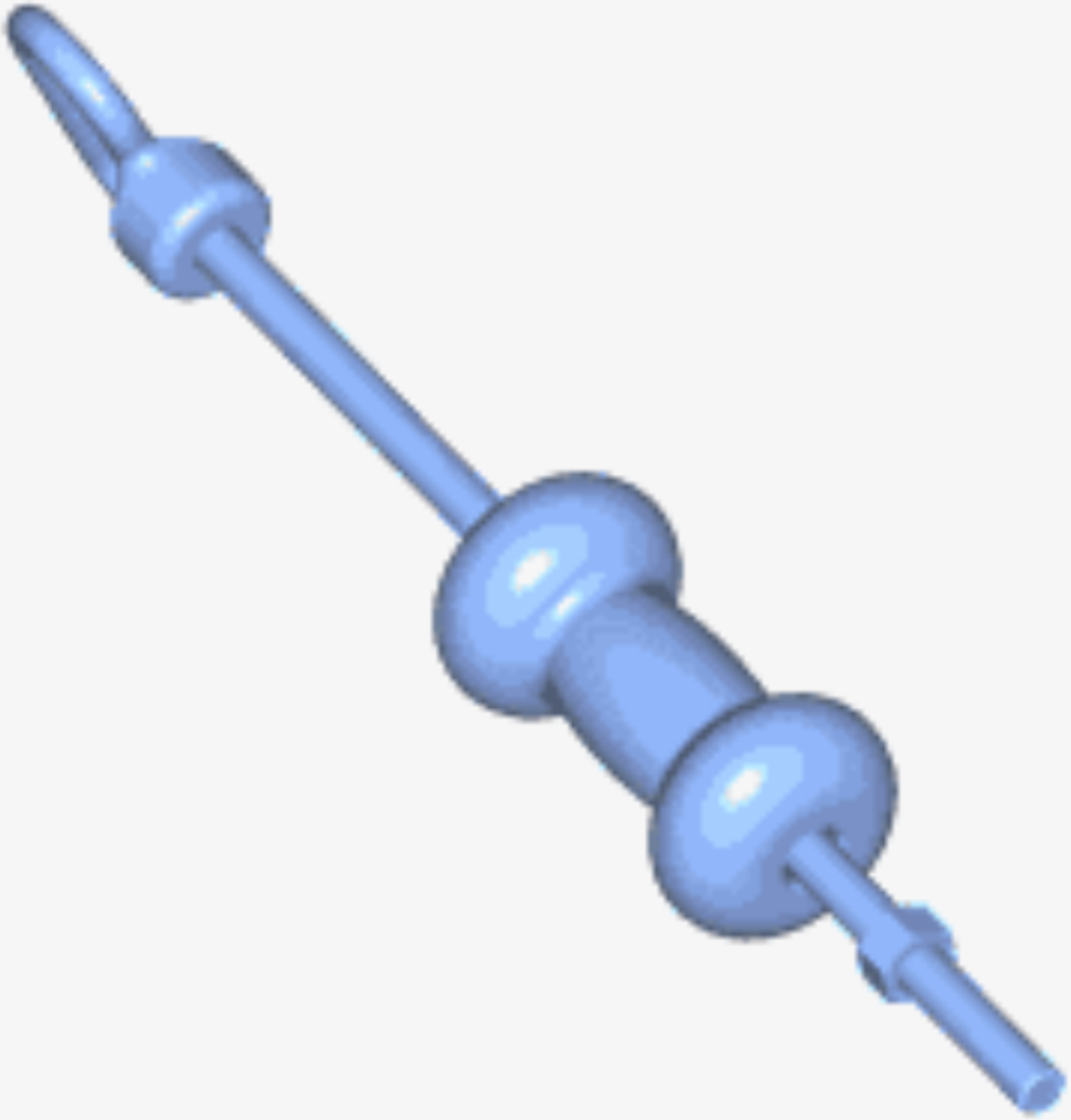
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| Illustration | Tool Number/Description |
| --- | --- |
|  | GE-8092<br>J-8092<br>Driver Handle |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | GE-8433-1<br>J-8433-1<br>Puller Bar |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | GE-02619-A<br>J-02619-A<br>Slide Hammer |

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| Illustration | Tool Number/Description |
| --- | --- |
|  | GE-3289-20<br>J-3289-20<br>Holding Fixture |

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