

TRANSMISSION

Transfer Case - BW 4474 - CTD Sedan

SPECIFICATIONS

APPROXIMATE FLUID CAPACITIES

Approximate Fluid Capacities

Application	Specification	
	Metric	English
Transfer Case Fluid - Mobil LT	0.78 L	0.80 qt

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Coil Nut	10 N.m	89 lb in
Fluid Temperature Sensor	22 N.m	16 lb ft
Oil Baffle Bolt	8 N.m	70 lb in
Oil Delivery Tube Fitting	6 N.m	53 lb in
Oil Drain Plug	25 N.m	18 lb ft
Oil Fill Plug	15 N.m	11 lb ft
Oil Pump Bolt	10 N.m	89 lb in
Rear Output Shaft Flange Nut	160 N.m	118 lb ft
Transfer Case Half Bolt	36 N.m	27 lb ft
Transfer Case Stud	11 N.m	97 lb in
Vibration Dampener Bolt	36 N.m	27 lb ft
Wiring Harness Clip Bolt	36 N.m	27 lb ft

TRANSFER CASE MECHANICAL SPECIFICATIONS

Transfer Case Mechanical Specifications

Application	Specification	
	Metric	English
Clutch Coil Resistance	2.5-3.5 ohms @ 20°C (68°F)	

SPACER AND SHIM SPECIFICATIONS

Spacer and Shim Specifications

Application	Specification		Stamp
	Metric	English	

Transfer Case All-Wheel Drive Clutch Shim	4.50-4.60	0.177-0.181	79
	4.70-4.80	0.185-0.189	82
	4.90-5.00	0.193-0.197	83
	5.10-5.20	0.200-0.205	84
	5.30-5.40	0.209-0.213	85
	5.50-5.60	0.216-0.220	86
	5.70-5.80	0.224-0.228	87

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Adhesives, Fluids, Lubricants, and Sealers

Application	Type of Material	GM Part Number	
		United States	Canada
Case Half Sealing Surfaces	Sealant	12346286	10953472
Oil Drain Plug Threads	Sealant	12346004	10953480
Oil Fill Plug Threads	Sealant	12346004	10953480
Oil Pump Cover Bolt Threads	Threadlocker	12345382	10953489
Rear Output Shaft and Flange Splines	Sealant	12346004	10953480
Transfer Case Fluid - Mobil LT	Transfer Case Fluid	88861950	88861951

SCHEMATIC WIRING DIAGRAMS

ALL-WHEEL DRIVE WIRING SCHEMATICS

All Wheel Drive (F46)

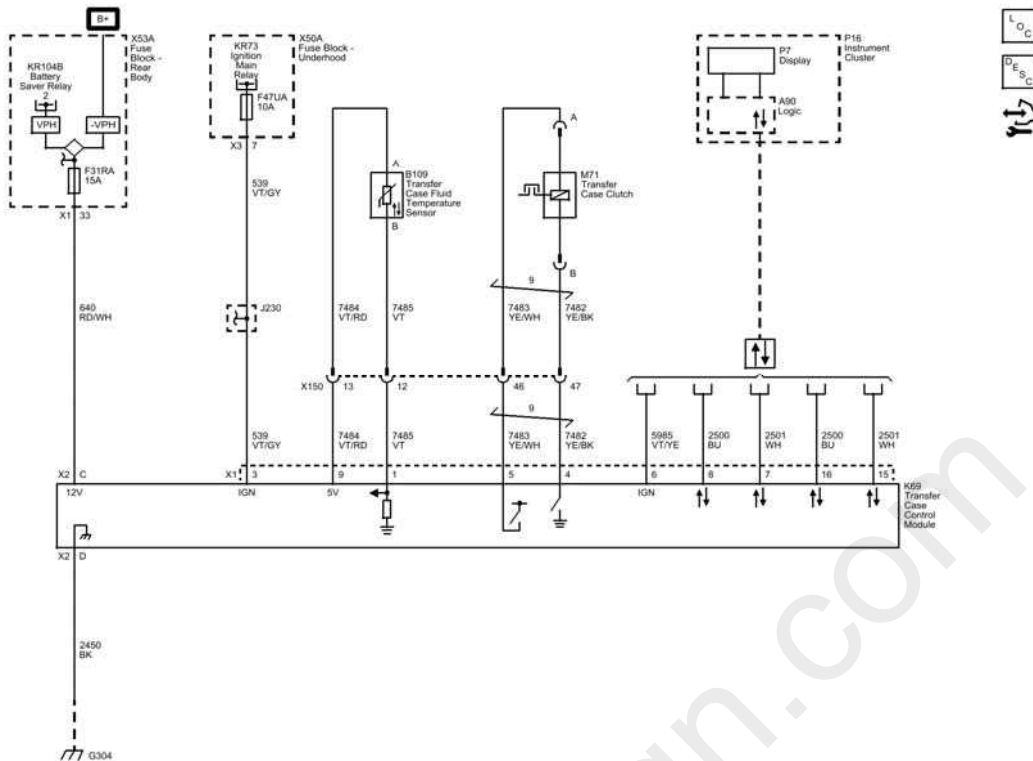


Fig. 1: All Wheel Drive (F46)

Courtesy of GENERAL MOTORS COMPANY

COMPONENT LOCATOR

TRANSFER CASE DISASSEMBLED VIEW

Case Components

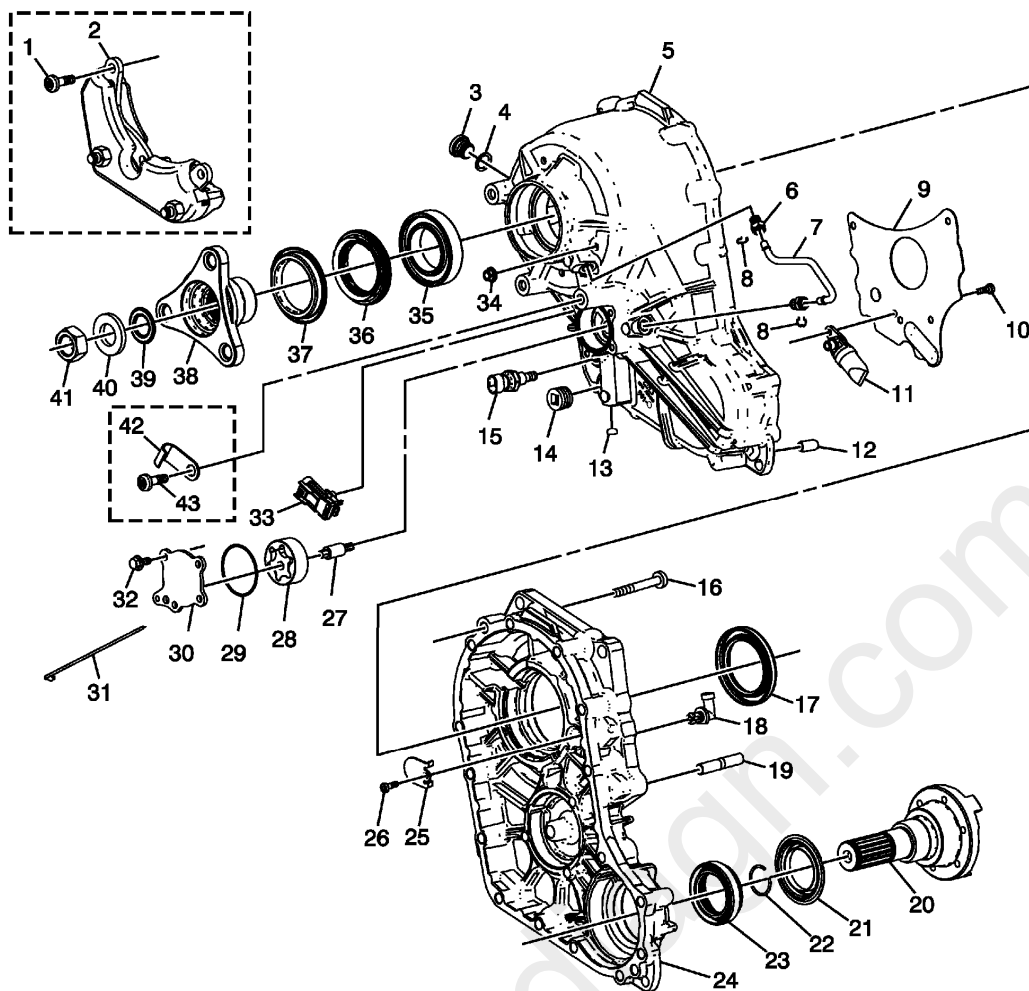


Fig. 2: Case Components
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transfer Case Vibration Dampener Bolt - Model Dependent
2	Transfer Case Vibration Dampener - Model Dependent
3	Transfer Case Oil Fill Plug
4	Transfer Case Oil Fill Plug Seal
5	Rear Case Half
6	Oil Delivery Tube Fitting
7	Oil Delivery Tube- Model Dependent
8	Oil Delivery Tube Fitting Clip
9	Transfer Case Oil Baffle
10	Transfer Case Oil Baffle Bolt
11	Transfer Case Oil Pump Screen
12	Transfer Case Half Locating Pin
13	Transfer Case Pump Plug

14	Transfer Case Oil Drain Plug
15	Transfer Case Fluid Temperature Sensor
16	Transfer Case Half Bolt
17	Transfer Case Input Shaft Seal
18	Transfer Case Vent
19	Transfer Case Stud
20	Transfer Case Front Output Shaft
21	Transfer Case Front Output Shaft Seal Dirt Deflector
22	Transfer Case Front Output Shaft Retaining Ring
23	Transfer Case Front Output Shaft Seal
24	Front Case Half
25	Transfer Case Oil Baffle
26	Transfer Case Oil Baffle Bolt
27	Oil Pump Shaft
28	Transfer Case Oil Pump Assembly
29	Transfer Case Oil Pump Seal
30	Transfer Case Oil Pump Cover
31	Strap
32	Transfer Case Oil Pump Bolt
33	Two/Four Wheel Drive Inline Wiring Connector
34	Coil Nut
35	Transfer Case Rear Output Shaft Rear Bearing
36	Transfer Case Rear Output Shaft Seal
37	Transfer Case Rear Output Shaft Seal Dirt Deflector
38	Transfer Case Rear Output Shaft Flange
39	Rear Output Shaft Flange O-ring Seal
40	Transfer Case Rear Output Shaft Flange Washer
41	Transfer Case Rear Output Shaft Flange Nut
42	Wiring Harness Clip - Model Dependent
43	Wiring Harness Clip Bolt - Model Dependent

Internal Components

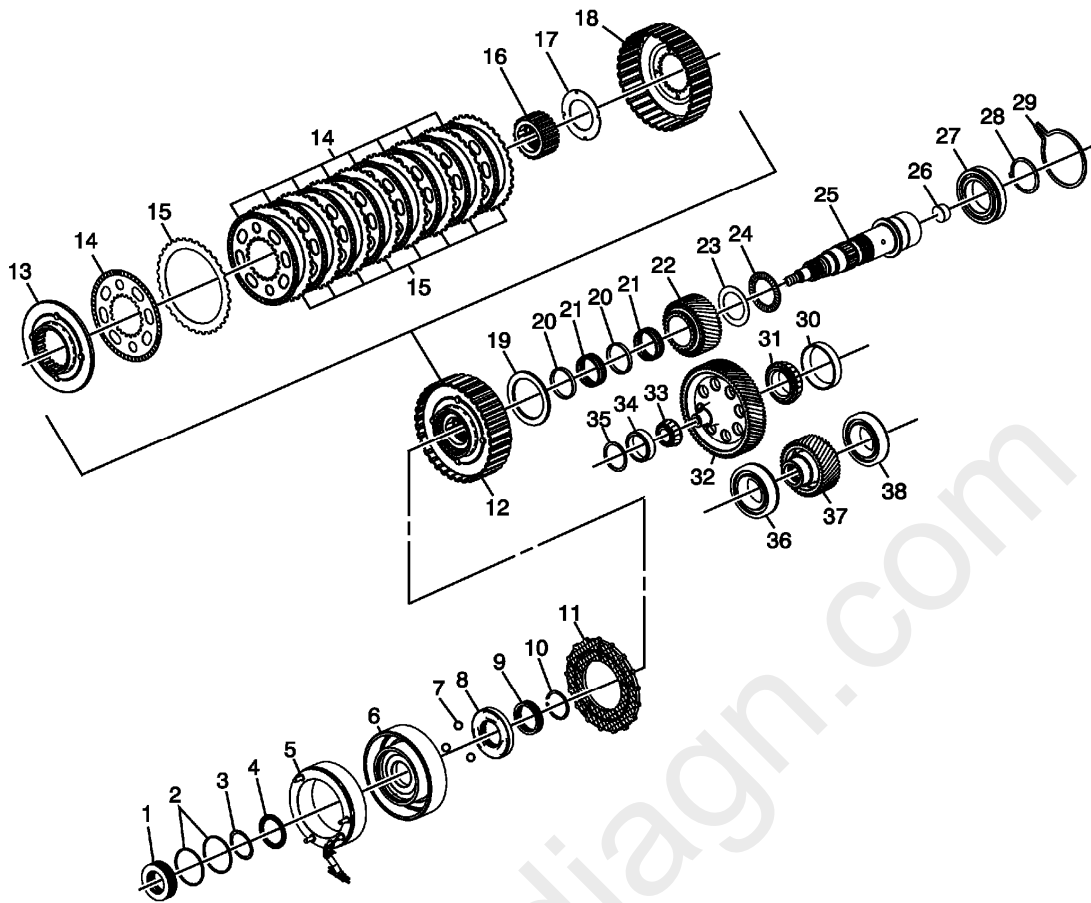


Fig. 3: Internal Components
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Oil Distribution Hub
2	Oil Distribution Hub Seals
3	Transfer Case Four Wheel Drive Clutch Shim
4	Transfer Case Four Wheel Drive Clutch Housing Bearing
5	Transfer Case Two/Four Wheel Drive Clutch Coil
6	Two/Four Wheel Drive Clutch Coil Housing
7	Transfer Case Apply Cam Ball
8	Transfer Case Apply Cam
9	Transfer Case Four Wheel Drive Clutch Spring
10	Transfer Case Two / Four Wheel Drive Clutch Retainer Ring
11	Armature
12	Transfer Case Front Drive Axle Clutch Assembly
13	Pressure Plate

14	Friction Plate
15	Separator Plate
16	Clutch Hub
17	Thrust Washer
18	Clutch Drum
19	Thrust Bearing
20	Transfer Case Input Shaft Spacer
21	Transfer Case Input Gear Bearing
22	Input Gear
23	Transfer Case Input Shaft Thrust Bearing Washer
24	Transfer Case Input Shaft Thrust Bearing
25	Transfer Case Input Shaft
26	Input Shaft Cup Plug
27	Transfer Case Input Bearing
28	Transfer Case Input Shaft Front Bearing Retainer Ring (Inner)
29	Transfer Case Input Shaft Front Bearing Retainer Ring (Outer)
30	Idler Gear Front Bearing Race
31	Idler Gear Front Bearing
32	Idler Gear
33	Idler Gear Rear Bearing
34	Idler Gear Rear Bearing Race
35	Idler Gear Bearing Shim
36	Transfer Case Front Output Shaft Rear Bearing
37	Front Output Shaft Gear
38	Transfer Case Front Output Shaft Front Bearing

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC C038C</u>	DTC C038C Transfer Case Clutch Identifier Not Programmed
<u>DTC C0399</u>	DTC C0399 01 Transfer Case Clutch Control Circuit Short To Battery DTC C0399 02 Transfer Case Clutch Control Circuit Short To Ground DTC C0399 04 Transfer Case Clutch Control Circuit Open
<u>DTC C0401</u>	DTC C0401 03 Transfer Case Fluid Temperature Sensor Circuit Low Voltage DTC C0401 07 Transfer Case Fluid Temperature Sensor Circuit High Voltage DTC C0401 08 Transfer Case Fluid Temperature Sensor Circuit Performance - Signal Invalid

<u>DTC P0562 or P0563</u>	DTC P0562 00 System Voltage Low Voltage DTC P0563 00 System Voltage High Voltage
<u>DTC P0601-P0604 or P062F</u>	DTC P0601 00 Control Module Read Only Memory Performance DTC P0604 00 Control Module Random Access Memory Performance DTC P062F 00 Control Module Long Term Memory Performance
<u>DTC P0641</u>	DTC P0641 00 5 V Reference 1 Circuit

DTC C038C: TRANSFER CASE CLUTCH IDENTIFIER NOT PROGRAMMED

Diagnostic Instructions

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

DTC Descriptor

DTC C038C

Transfer Case Clutch Identifier Not Programmed

Circuit/System Description

- This is an internal fault detection of the transfer case control module. No external circuits are involved.
- This DTC is set anytime the transfer case control module is replaced or reprogrammed.
- The Transfer Case Clutch Identifier Configuration/Reset function must be performed to clear this code.

Conditions for Running the DTC

- Engine ON.
- System voltage 9-18 V.
- The diagnostic is run 5 s after engine ON.

Conditions for Setting the DTC

- The transfer case control module detects an invalid transfer case clutch identifier number in memory.
- The valid production transfer case clutch identifier numbers are 1-9.
- The valid service transfer case clutch calibration identification number is 9.

Action Taken When the DTC Sets

- The K69 Transfer Case Control Module defaults to transfer case clutch identifier number 9 performance.
- The SERVICE 4WD indicator will NOT illuminate.
- Failure records will be recorded.

Conditions for Clearing the DTC

The K69 Transfer Case Control Module clears the DTC once the Transfer Case Clutch Identifier Configuration/Reset function has been successfully performed.

Diagnostic Aids

- Any time the clutch pack assembly, the K69 Transfer Case Control Module, or the transfer case assembly has been replaced, the Transfer Case Clutch Identifier Configuration/Reset function needs to be run.
- If power is lost during Transfer Case Clutch Identifier Configuration/Reset, the transfer case control module may get stuck in a programming loop and will not be able to update. If this occurs, and the DTC resets, replace the transfer case control module.

Reference Information

Schematic Reference

All-Wheel Drive Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information.

Circuit/System Verification

1. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down.
2. Engine running for at least 1 minute.
3. Verify that DTC C038C is not set.

- **If the DTC is set**

Perform the Transfer Case Clutch Identifier Configuration/Reset function. Refer to Transfer Case Shift Control Module Scan Tool Information (BW 4474) .

- **If the DTC is not set**

4. All OK.

Repair Instructions

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

- **Control Module References** for K69 Transfer Case Control Module replacement, setup, and programming
- **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** for Transfer Case Clutch Identifier Configuration/Reset

DTC C0399: TRANSFER CASE CLUTCH CONTROL CIRCUIT

Diagnostic Instructions

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

DTC Descriptors

DTC C0399 01

Transfer Case Clutch Control Circuit Short To Battery

DTC C0399 02

Transfer Case Clutch Control Circuit Short To Ground

DTC C0399 04

Transfer Case Clutch Control Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Battery	Signal Performance
Control	C0399 02	C0399 04	C0399 01	-
Low Reference	C0399 02	C0399 04	C0399 01	-

Circuit/System Description

The transfer case normally operates in 2WD mode. When all wheel drive (AWD) is requested, the transfer case control module sends 12 volts to the transfer case clutch coil via the clutch coil control circuit. This engages the transfer case clutch assembly through a ball and cam apply system. The transfer case clutch coil is controlled by a high and low side driver. Both circuits must be activated to engage the system.

Conditions for Running the DTC

- Engine ON.
- System voltage 8.5-18.0 V.
- High side and low side drivers must be commanded OFF.
- These DTC's run during transfer case control module power up.

Conditions for Setting the DTC

C0399 01

The voltage detected by the transfer case control module, on the control circuit and the low reference circuit when both the high side driver and the low side driver are off, is greater than 3.9 V for greater than 5 s.

C0399 02

The voltage detected by the transfer case control module, on the control circuit and the low reference circuit, when both the high side driver and the low side driver are off, is 0.00 V for greater than 5 s.

C0399 04

The voltage detected by the transfer case control module is greater than 0.9 V on the control circuit when the high side driver is off, and 0.0 V on the low reference circuit when the low side driver is off for greater than 5 s.

Action Taken When the DTC Sets

- The transfer case will be in 2WD mode while the fault is present.
- AWD disabled.
- The SERVICE AWD indicator remains illuminated for the remainder of the current ignition cycle.
- The transfer case control module records the operating conditions at the time of the failure in the Failure Records.

Conditions for Clearing the DTC

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

Diagnostic Aids

- Check failure records for further information on the conditions present when this DTC set.
- Make sure system voltage is above 9.0 volts as Special Functions will not work correctly if the system is below this voltage.

- The default actions for DTC P0562 or P0563 may cause this DTC to set.
- The transfer case drain plug is a good source for ground.
- **EL-49742** harness is a good source for B+ and ground.
- The transfer case drain plug is a good source for ground.

Reference Information

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All-Wheel Drive Schematics

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Electrical Information Reference

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- Wiring Repairs

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

J 35616 GM-Approved Terminal Test Kit

Circuit/System Verification

1. Ignition ON, engine OFF.
2. Verify DTC C0399 is only set as a history DTC.
 - **If the DTC is set as current**

Refer to Circuit/System Testing.
 - **If the DTC is set as history**

NOTE: After inspection, apply Nyogel lubricant 760G to each connector terminal.

Ensure each connector and CPA is correctly seated.

3. Visually inspect each connector terminal of the K69 Transfer Case Control Module connector for damage or corrosion.

- **If damage or corrosion exists**

Repair as necessary.

- **If damage or corrosion does not exist**

4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data. The DTC should not set.

- **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

5. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the M71 Transfer Case Clutch Coil.

NOTE:

- **When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J 35616 GM-Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.**
- **Testing for steps 2-3 is performed on the M71 Transfer Case Clutch Coil harness connector using the PU probe J 35616-4A, and K69 Transfer Case Control Module harness connector X1 using the GY probe J 35616-2A.**
- **The low side driver of the low reference circuit has a high resistance to chassis ground when not activated, greater than 15 K ohms.**
- **Testing for steps 2-3 is performed within 15 seconds of using the key fob to unlock the doors. After 15 seconds the voltage on the control circuit will drop to the diagnostic 0.15-0.40 V.**
- **An alternate method to using the key fob to activate the control circuit is to perform steps 2-3 with the engine running. With the engine running, the voltage on the control circuit should be a constant 3.4-3.9 V.**

2. Test for 3.4-3.9 V between the control circuit, terminal A, and ground.

- **If less than 3.4 V**

1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
2. Test for less than 10 ohms in control circuit end to end.

- If 10 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 10 ohms
- 3. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance
- 4. Test for infinite resistance between the control circuit, terminal 5, and all other pins of the K69 Transfer Case Control Module harness connector X1.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
- **If greater than 3.9 V**
- 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
- 2. Ignition ON, engine OFF.
- 3. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
- 4. Test for infinite resistance between the control circuit, terminal 5, and all other pins of the K69 Transfer Case Control Module harness connector X1.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
- **If between 3.4-3.9 V**
- 3. Test for 3.4-3.9 V between the control circuit, terminal A, and the low reference circuit, terminal B.
 - **If less than 3.4 V**
- 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
- 2. Test for less than 10 ohms in the low reference circuit end to end.
 - If 10 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 10 ohms
- 3. Test for infinite resistance between the low reference circuit and ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance
- 4. Test for infinite resistance between the low reference circuit, terminal 4, and all other pins of the K69 Transfer Case Control Module harness connector X1.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
- **If greater than 3.9 V**

1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
2. Ignition ON, engine OFF.
3. Test for less than 1 V between the low reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
4. Test for infinite resistance between the low reference circuit, terminal 4, and all other pins of the K69 Transfer Case Control Module harness connector X1.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
- If between 3.4-3.9 V
4. Control circuit, low reference, and K69 Transfer Case Control Module OK.

Component Testing

M71 Transfer Case Clutch Coil

1. Ignition OFF, disconnect the harness connector at the M71 Transfer Case Clutch Coil.

NOTE: Testing for step 2 is performed on the M71 Transfer Case Clutch Coil using the PU probe J 35616-5.

2. Test for 2.5-3.5 ohms between the control circuit, terminal A, and the low reference circuit, terminal B.
 - If not between 2.5-3.5 ohms

Replace the M71 Transfer Case Clutch Coil and perform the Transfer Case Clutch Identifier Configuration/Reset function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .

- If between 2.5-3.5 ohms
3. M71 Transfer Case Clutch Coil OK.

Repair Instructions

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

- **Control Module References** for transfer case control module replacement, setup, and programming
- **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** for the Transfer Case Clutch Identifier Configuration/Reset function
- **Transfer Case Assembly Replacement**

DTC C0401: TRANSFER CASE FLUID TEMPERATURE SENSOR

Diagnostic Instructions

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

DTC Descriptors

DTC C0401 03

Transfer Case Fluid Temperature Sensor Circuit Low Voltage

DTC C0401 07

Transfer Case Fluid Temperature Sensor Circuit High Voltage

DTC C0401 08

Transfer Case Fluid Temperature Sensor Circuit Performance - Signal Invalid

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	P0641	P0641	P0641	P0641
Low Reference	-	C0401 03	C0401 07	C0401 08

Circuit/System Description

The transfer case fluid temperature sensor is a thermistor. The transfer case control module supplies a 5-volt reference circuit and a low reference circuit to the sensor. When the transfer case fluid is cold, the sensor resistance is high and the transfer case control module senses a low signal voltage on the low reference circuit. As the transfer case fluid warms, the sensor resistance lowers and the transfer case control module senses higher voltage on the low reference circuit. The transfer case control module uses this information to modify all-wheel drive duty cycle.

Conditions for Running the DTC

- Engine ON for at least 5 s.
- System voltage is 8.5-18.0 V.
- DTC P0641 is not set.
- DTC C0401 03 and DTC C401 08 run continuously.
- DTC C0401 07 runs at key ON provided there has been an engine off period of at least 10 minutes prior to the key ON.

Conditions for Setting the DTC

C0401 03

- Vehicle speed greater than 73 kph (45 mph) for 5 minutes during an ignition cycle. Time at speed does not have to be continuous.
- The transfer case control module detects that the transfer case temperature is less than -40°C (-40°F) (0.03 V). (Sensor stuck LOW).
- This DTC runs continuously.

C0401 07

- Engine off time since last engine ON, 10 minutes.
- The transfer case control module detects that the transfer case temperature is greater than 149°C (300°F) (4.97 V). (Sensor stuck HIGH).
- This DTC runs at transfer case control module power up.

C0401 08

- The transfer case control module detects an abrupt transfer case temperature change of greater than 20°C (36°F) per second with the low reference stuck high or stuck low for 5 s.
- This DTC runs continuously.

Action Taken When the DTC Sets

- Transfer case defaults to 2WD.
- The transfer case fluid temperature will default to estimated values based on engine intake air temperature and transmission fluid temperature.
- Failure record recorded.
- The SERVICE AWD indicator will NOT illuminate.
- The AWD OFF indicator will illuminate if due to an actual overheat condition.

Conditions for Clearing the DTC

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

Diagnostic Aids

- Check failure records for further information on the conditions present when this DTC set.
- If the transfer case oil temperature sensor circuits are open or have high resistance the scan tool will indicate -40°C (-40°F).
- If the transfer case oil temperature circuits are shorted to voltage the scan tool will read 154°C (300°F).

- If the transfer case fluid temperature DTC is set due to an actual overheat condition, and not an electrical fault, the SERVICE AWD indicator will NOT illuminate, but the AWD OFF indicator WILL illuminate for as long as the temperature stays above the 135°C (275°F) thermal reset threshold.
- Once corrected, you must power down the K69 transfer case control module in order to clear this code.
- **EL-49742** harness is a good source for B+ and ground.
- The transfer case drain plug is a good source for ground.

Reference Information

Schematic Reference

All-Wheel Drive Schematics

Connector End View Reference

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Electrical Information Reference

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DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information.

Circuit/System Verification

1. Ignition ON, Engine OFF.
2. Verify DTC P0641 is NOT set.
 - **If DTC P0641 is set**

Diagnose DTC P0641 first. Refer to **DTC P0641**.

- **If DTC P0641 is NOT set**
3. Verify the transfer case 5V Reference parameter remains between 4.875-5.125 V.
 - **If NOT between 4.875-5.125 V**

Refer to Circuit/System Testing.

- **If between 4.875-5.125 V**

4. Verify the transfer case 5V Reference Circuit Status parameter displays OK.

- **If the transfer case 5V Reference Circuit Status parameter does NOT display OK**

Refer to Circuit/System Testing.

- **If the transfer case 5V Reference Circuit Status parameter does display OK**

5. Verify DTC C0401 is only set as a history DTC.

- **If the DTC is set as current**

Refer to Circuit/System Testing.

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

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

6. Verify the integrity of each connector terminal of the K69 Transfer Case Control Module connector and the B109 Transfer Case Fluid Temperature Sensor connector for damage or corrosion. Repair as necessary.

7. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

8. Verify the DTC C0401 does not set.

- **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

9. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the B109 Transfer Case Fluid Temperature Sensor.

NOTE:

- **When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J 35616 GM-Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.**
- **The low side driver of the low reference circuit has a high resistance to chassis ground, greater than 800 ohms.**
- **Testing for steps 2-5 is performed on the B109 Transfer Case Fluid Temperature Sensor harness / K69 Transfer Case Control Module harness using the GY probe J 35616-2A.**

- Testing for steps 2-3 is performed within 15 seconds of using the key fob to unlock the doors. After 15 seconds the voltage on the 5 V reference circuit will drop to 0.0 V.
- An alternate method to using the key fob to activate the 5 V reference circuit is to perform steps 2-3 with the engine running. With the engine running, the voltage on the 5 V reference circuit should be a constant 4.875-5.125 V.

2. Test for 4.875-5.125 V between the transfer case 5 V reference circuit terminal A, and ground.

○ **If less than 4.875 V**

1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
2. Test for infinite resistance between the 5 V reference circuit, K69 Transfer Case Control Module X1 harness terminal 9, and body ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance
3. Test for less than 2 ohms in the 5 V reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms
4. Test for infinite resistance between the 5 V reference circuit, terminal 9, and all other pins of the K69 Transfer Case Control Module X1 harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset Function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .

○ **If greater than 5.125 V**

1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
2. Test for infinite resistance between the 5 V reference circuit, terminal 9, and all other pins of the K69 Transfer Case Control Module X1 harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset Function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .

○ **If between 4.875-5.125 V**

3. Test for 4.875-5.125 V between the transfer case 5 V reference circuit terminal A, and the low reference circuit terminal B.

○ **If less than 4.875 V**

1. Ignition OFF, disconnect the X harness connector at the K69 Transfer Case Control Module.
2. Test for infinite resistance between the low reference circuit, K69 Transfer Case Control Module X1 harness terminal 1, and body ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance

3. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms
4. Test for infinite resistance between the low reference circuit, terminal 1, and all other pins of the K69 Transfer Case Control Module X1 harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset Function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
 - **If greater than 5.125 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the low reference circuit, terminal 1, and all other pins of the K69 Transfer Case Control Module X1 harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset Function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
 - **If between 4.875-5.125 V**
4. 5 V reference circuit, transfer case oil temperature sensor low reference circuit, and the transfer case control module OK.

Component Testing

B109 Transfer Case Fluid Temperature Sensor

1. Ignition ON, engine OFF.
 2. Record the value from the Transfer Case Fluid Temperature Sensor parameter.
 3. Ignition OFF, disconnect the X1 harness connector at the B109 Transfer Case Fluid Temperature Sensor.
 4. Ignition ON, engine OFF.
 5. Verify the scan tool Transfer Case Fluid Temperature Sensor parameter displays -40°C/-40°F.
 - **If the parameter does NOT display -40°C/-40°F**
- Refer to Circuit/System Testing.
- **If the parameter does display -40°C/-40°F**
 6. Using a fused jumper, jump the 5 V reference circuit terminal A to the low reference circuit terminal B at the B109 Transfer Case Fluid Temperature Sensor connector.
 7. Verify the scan tool Calculated Transfer Case Clutch Temperature parameter displays 154°C/300°F.
 - **If less than 154°C/300°F**

Refer to Circuit/System Testing.

- If greater than 154°C/300°F

Refer to Circuit/System Testing.

- If 154°C/300°F

NOTE:

- When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J 35616 GM-Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.
- Testing for Step 8 is performed on the B109 Transfer Case Fluid Temperature Sensor using the GY probe J 35616-3.

8. Test the resistance between the 5 V reference circuit terminal A and the low reference circuit terminal B at the B109 Transfer Case Fluid Temperature Sensor. Refer to the Temperature Versus Resistance table below for the resistance values at various temperatures.

- If the resistance is outside the specified range

Replace the B109 Transfer Case Fluid Temperature Sensor.

- If the resistance is within the specified range

9. B109 Transfer Case Fluid Temperature Sensor OK.

Temperature Versus Resistance

Temp (°C/°F)	ohms	Nominal
-40/-40	95000-10600	100865
-20/-4	27000-3000	28582
0/32	9000-9800	9400
20/68	3400-3700	3500
30/86	2400-2100	2240
40/104	1400-1600	1465
50/122	1100-900	980
60/140	600-800	670
80/176	300-400	330
100/210	150-200	180

Repair Instructions

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

- **Control Module References** for transfer case control module replacement, setup, and programming
- **Transfer Case Fluid Temperature Sensor Replacement**
- **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** for Transfer Case Clutch

Identifier Configuration/Reset function information

DTC P0562 OR P0563: SYSTEM VOLTAGE

Diagnostic Instructions

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

DTC Descriptor

DTC P0562 00

System Voltage Low Voltage

DTC P0563 00

System Voltage High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Battery Positive Voltage	P0562 00	P0562 00	P0563 00	-
Run/Crank Ignition 1 Voltage	P0562 00	P0562 00	P0563 00	-
Ground	-	P0562 00	-	-

Circuit/System Description

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

Conditions for Running the DTC

- Ignition ON.
- System voltage is 6.0-18.0 volts.
- The diagnostic is run 5 s after engine ON.

Conditions for Setting the DTC

P0562 00

System voltage less than 8.5 V.

P0563 00

System voltage greater than 18.0 V.

Action Taken When the DTC Sets

- The vehicle will default to 2WD while the fault is present.
- The AWD OFF indicator will be illuminated.
- Failure records will be recorded.
- If the voltage drops below 7 V, the transfer case control module will go offline and a Service AWD indicator will then be illuminated because the transfer case control module will no longer be transmitting on the Serial Data Line.

Conditions for Clearing the DTC

- The transfer case control module clears the DTC if the conditions for setting the DTC are not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- All DTCs can be cleared using a scan tool.
- Clearing DTCs will also clear failure records.

Diagnostic Aids

- Check failure records for further information on the conditions present when this DTC set.
- Check other modules for voltage related DTCs as this may indicate a system wide voltage issue.
- High voltage is likely a vehicle issue, such as an alternator problem, or the vehicle has been hooked up improperly during a jump start or overcharged with a battery charger.

Reference Information

Schematic Reference

All-Wheel Drive Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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. Ignition ON, engine OFF.
2. Verify that the transfer case control module fuse, fuse 31 (X53A rear body fuse block) is NOT open.
 - **If the fuse is OPEN**

Test the battery positive voltage circuit, K69 Transfer Case Control Module harness X2 terminal C, for a short to ground.

- **If the fuse is OK**

3. Verify that the IP Body Ign fuse, fuse 47 (X50A fuse block - underhood) is NOT open.
 - **If the fuse is OPEN**

Test the Run/Crank Ignition 1 voltage circuit, K69 Transfer Case Control Module harness X1 terminal 3, for a short to ground.

- **If the fuse is OK**

NOTE: **A low battery voltage or charging system condition may cause a DTC to set.**

4. Verify DTC B0151A, B151C, B1527, P0621, P0622, P0625 or P0626 is not set.
 - **If any of the DTCs are set**

Diagnose that DTC first. Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** for further diagnosis.

- **If none of the DTCs are set**

5. Verify that the scan tool transfer case control module voltage signal parameter displays B+ (+0.0/-1.0 V).
 - **If the parameter does not display B+ (+0.0/-1.0 V)**

Refer to Circuit/System Testing.

- **If the parameter does display B+ (+0.0/-1.0 V)**

6. Verify DTC P0562 or P0563 is only set as a history DTC.

- **If the DTC is set as current**

Refer to Circuit/System Testing.

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

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

7. Visually inspect each connector terminal of the K69 Transfer Case Control Module connector for damage or corrosion. Repair as necessary.
8. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data. The DTC should not set.
 - **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

9. All OK.

Circuit/System Testing

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

NOTE:

- When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J 35616 GM-Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.
- Testing for steps 2-3 is performed on the K69 Transfer Case Control Module harness connector X2 using the GY probe J 35616-2A.

2. Test for less than 10 ohms between the ground circuit terminal D and ground.

- **If 10 ohms or greater**

Repair the open/high resistance in the circuit.

- **If less than 10 ohms**

3. Test for B+ (+0.0/-1.0 V) between the battery positive voltage circuit terminal C, and the ground circuit terminal D.

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

1. Remove the transfer case control module fuse, X53A rear body fuse block.
2. Test for less than 10 ohms in the battery positive voltage circuit end to end.
 - If 10 ohms or greater, repair the open/high resistance in the circuit.

- If less than 10 ohms
- 3. Test for infinite resistance between the battery positive voltage circuit and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance
- 4. Test for infinite resistance between the battery positive voltage circuit, terminal C and all other pins of the K69 Transfer Case Control Module harness connector X2.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
- **If B+ (+0.0/-1.0 V)**
- 4. Disconnect the X1 harness connector at the K69 Transfer Case Control Module.
- 5. Ignition ON, engine ON.

NOTE: **Testing for steps 6-7 is performed on the K69 Transfer Case Control Module harness connector X1 using the PU probe J 35616-4A.**

- 6. Test for B+ (+0.0/-1.0 V) between the Run/Crank Ignition 1 Voltage circuit terminal 3 and ground.
 - **If less than B+ (+0.0/-1.0 V)**
 - 1. Test for less than 10 ohms in the Run/Crank Ignition 1 Voltage circuit end to end.
 - If 10 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 10 ohms
 - 2. Test for infinite resistance between the Run/Crank Ignition 1 Voltage circuit, terminal 3 and all other pins of the K69 Transfer Case Control Module harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
 - **If greater than B+ (+0.0/-1.0 V)**

Test the charging system for proper operation. Refer to **Charging System Test** .

- **If B+ (+0.0/-1.0 V)**
- 7. Battery positive voltage circuit, ground circuit, and K69 Transfer Case Control Module OK.

Repair Instructions

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

- **Control Module References** for transfer case control module replacement, setup, and programming
- **Power Mode Mismatch** to verify relays are operating properly
- **DTC B1325, B1327, B1328, B1330, B1390, B1400, B1410, B1517, C0800, C0805, C0895, C0899,**

C0900, P0560, P0562, P0563, P129B, or P129C to verify the system voltage is within normal operating range

DTC P0601, P0602, P0603, P0604 OR P062F: CONTROL MODULE MEMORY

Diagnostic Instructions

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

DTC Descriptors

DTC P0601 00

Control Module Read Only Memory Performance

DTC P0604 00

Control Module Random Access Memory Performance

DTC P062F 00

Control Module Long Term Memory Performance

Circuit/System Description

This is an internal fault detection of the K69 transfer case control module. This fault is handled inside the K69 transfer case control module. No external circuits are involved.

At each power-up, the K69 transfer case control module runs a self-test on the following:

- EEPROM Checksum
- ROM Checksum
- RAM Checksum

Conditions for Running the DTC

- Engine ON.
- System voltage 8.5-18 V
- Diagnostic run continuously - DTC P0601 only
- Diagnostic run at transfer case control module power up - DTCs P0604 and P062F

Conditions for Setting the DTC

P0601

The read only memory (ROM), or the masked ROM, of the transfer case control module has failed the Checksum test indicating that the data is not currently valid.

P0604

The random access memory (RAM) of the transfer case control module has failed an operational test indicating that some portions of RAM are non-functional.

P062F

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

Action Taken When the DTC Sets

P0601 and P0604

- DTCs P0601 and P0604 are Type C DTCs.
- The transfer case will default to 2WD High for the remainder of the current ignition cycle.
- No further range changes shall be allowed.
- The SERVICE AWD indicator remains illuminated for the remainder of the current ignition cycle.
- The transfer case control module will store freeze frame data.

P062F

- DTC P062F is a Type C DTC.
- Default Long Term Memory Values will be used.
- The SERVICE AWD indicator will NOT illuminate.
- The transfer case control module will store freeze frame data.

Conditions for Clearing the DTC

DTCs P0601, P0604, and P062F are Type C DTCs.

Diagnostic Aids

- DTC P0601 detects a non-volatile memory write error (ROM).
- DTC P0604 detects the wrong copy of non-volatile memory in RAM or a RAM read/write failure.
- DTC P062F detects a corruption of the EPROM/Flash memory.
- Low voltage or a momentary loss of power or ground to the transfer case control module may cause a DTC to set. Verify the following:
 - The battery cables are clean and tight, and the battery is fully charged. Refer to **Battery Inspection/Test**.
 - The transfer case control module ground circuits do not have an open or high resistance.

- The transfer case control module power circuits do not have an open, short to ground, or high resistance.

Reference Information

Schematic Reference

All-Wheel Drive Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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. Ignition OFF for at least 1 minute to allow for the complete shutdown of the K69 Transfer Case Control Module. Engine ON.
2. Verify that DTC P0601, DTC P0604, or DTC P062F is only set as a history DTC.
 - **If any of the DTC's are set as current**
 1. Program the K69 Transfer Case Control Module. Refer to **Control Module References** .
 2. Verify none of the DTC's reset.
 - If any of the DTC's reset, replace the K69 Transfer Case Control Module. Refer to **Control Module References**
 - If none of the DTC's reset
3. All OK.

- If any of the DTC's are set as history

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

3. Visually inspect each connector terminal of the K69 Transfer Case Control Module connector for damage or corrosion. Repair as necessary.
4. Clear DTC P0601, DTC P0604, or DTC P062F from history.
5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data. The DTC should not set.
 - If any of the DTC's set

Replace the K69 Transfer Case Control Module. Refer to **Control Module References** .

- If none of the DTC's set

6. All OK.

Repair Instructions

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

Control Module References for K69 Transfer Case Control Module replacement, setup, and programming

DTC P0641: 5 V REFERENCE 1 CIRCUIT

Diagnostic Instructions

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

DTC Descriptor

DTC P0641 00

5 V Reference 1 Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	P0641	P0641	P0641	P0641
Low Reference	-	C0401 03	C0401 07	C0401 08

Circuit/System Description

The transfer case fluid temperature sensor is a thermistor. The transfer case control module supplies a 5-volt reference circuit and a low reference circuit to the sensor. When the transfer case fluid is cold, the sensor resistance is high and the transfer case control module senses a low signal voltage on the low reference circuit. As the transfer case fluid warms, the sensor resistance lowers and the transfer case control module senses higher voltage on the low reference circuit. The transfer case control module uses this information to modify all-wheel drive duty cycle.

Conditions for Running the DTC

- Engine ON for at least 5 s.
- System voltage is 8.5-18.0 V.
- DTC P0641 runs continuously.

Conditions for Setting the DTC

Transfer case oil temperature 5 V reference voltage NOT 4.875-5.125 V.

Action Taken When the DTC Sets

- DTC P0641 is a type C DTC.
- The transfer case fluid temperature will default to estimated values based on engine intake air temperature and transmission fluid temperature.
- Failure record recorded.
- The Service AWD indicator will NOT illuminate.

Conditions for Clearing the DTC

- DTC P0641 is a type C DTC.
- The transfer case control module clears an active DTC once the conditions for setting the DTC are no longer present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- All DTCs can be cleared using a scan tool.
- Clearing DTCs will also clear failure records.

Diagnostic Aids

- Check failure records for further information on the conditions present when this DTC set.
- If the transfer case oil temperature sensor circuits are open, or have high resistance, the scan tool will indicate -40°C/-40°F.
- If the transfer case oil temperature circuits are shorted to voltage, the scan tool will read 154°C/300°F.
- This fault will likely not be noticed by the driver. However, you can address this fault by looking at the transfer case 5 V reference parameter on the scan tool. The voltage should never be below 4.875 volts or above 5.125 volts.
- Once corrected, you must power down the K69 Transfer Case Control Module in order to clear this code.

- The transfer case drain plug is a good source for ground.
- **EL-49742** harness is a good source for B+ and ground.

Reference Information

Schematic Reference

All-Wheel Drive Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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

NOTE: **This fault will not likely be noticed by the driver.**

1. Verify the scan tool transfer case 5 V Reference parameter remains between 4.875-5.125 V.
 - **If NOT 4.875-5.125 V**

Refer to Circuit/System Testing.

 - **If 4.875-5.125 V**
2. Verify the scan tool transfer case 5 V Reference Circuit Status parameter displays OK.
 - **If the transfer case 5 V Reference Circuit Status parameter does NOT display OK**

Refer to Circuit/System Testing.

 - **If the transfer case 5 V Reference Circuit Status parameter does display OK**
3. Verify DTC P0641 is only set as a history DTC.

- **If the DTC is set as current**

Refer to Circuit/System Testing.

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

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

4. Verify the integrity of each connector terminal of the K69 Transfer Case Control Module connector and the B109 Transfer Case Fluid Temperature Sensor connector for damage or corrosion. Repair as necessary.
5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data. The DTC should not set.

- **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the B109 Transfer Case Fluid Temperature Sensor.

NOTE:

- When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J 35616 GM-Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.
- The low side driver of the low reference circuit has a high resistance to chassis ground, greater than 800 ohms.
- Testing for steps 3-4 is performed on the B109 transfer case fluid temperature sensor harness / K69 transfer case control module harness using the GY probe J 35616-2A.
- The low side driver of the low reference circuit has a high resistance to chassis ground when not activated, greater than 15 K ohms.
- Testing for steps 2-3 is performed within 15 seconds of using the key fob to unlock the doors. After 15 seconds the voltage on the 5 V reference circuit will drop to 0.0 V.
- An alternate method to using the key fob to activate the 5 V reference circuit is to perform steps 2-3 with the engine running. But the engine running, a voltage on the 5 volt reference circuit should be a constant 4.875-5.125 V.

2. Test for 4.875-5.125 V between the transfer case 5 V reference circuit terminal A, and ground.
 - **If less than 4.875 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the 5 V reference circuit, K69 Transfer Case Control Module X1 harness terminal 9, and body ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the 5 V reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms
 4. Test for infinite resistance between the 5 V reference circuit, terminal 9, and all other pins of the K69 Transfer Case Control Module X1 harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset Function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
 - **If greater than 5.125 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the 5 V reference circuit, terminal 9, and all other pins of the K69 Transfer Case Control Module X1 harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset Function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .
 - **If between 4.875-5.125 V**
3. Test for 4.875-5.125 V between the transfer case 5 V reference circuit terminal A, and the low reference circuit terminal B.
 - **If less than 4.875 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the low reference circuit, K69 Transfer Case Control Module X1 harness terminal 1, and body ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms
 4. Test for infinite resistance between the low reference circuit, terminal 1, and all other pins of the K69 Transfer Case Control Module X1 harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the

Transfer Case Clutch Identifier Configuration/Reset Function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .

- **If greater than 5.125 V**

1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
2. Test for infinite resistance between the low reference circuit, terminal 1, and all other pins of the K69 Transfer Case Control Module X1 harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 Transfer Case Control Module and perform the Transfer Case Clutch Identifier Configuration/Reset Function. Refer to **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** .

- **If between 4.875-5.125 V**

4. 5 V reference circuit, transfer case oil temperature sensor low reference circuit, and the transfer case control module OK.

Component Testing

B109 Transfer Case Fluid Temperature Sensor

1. Ignition ON, engine OFF.
2. Record the value from the Transfer Case Fluid Temperature Sensor parameter.
3. Ignition OFF, disconnect the X1 harness connector at the B109 Transfer Case Fluid Temperature Sensor.
4. Ignition ON, engine OFF.
5. Verify the scan tool Transfer Case Fluid Temperature Sensor parameter displays -40°C/-40°F.
 - **If the parameter does NOT display -40°C/-40°F**

Refer to Circuit/System Testing.

- **If the parameter does display -40°C/-40°F**

6. Using a fused jumper, jump the 5 V reference circuit terminal A to the low reference circuit terminal B at the B109 Transfer Case Fluid Temperature sensor connector.
7. Verify the scan tool Calculated Transfer Case Clutch Temperature parameter displays 154°C/300°F.
 - **If less than 154°C/300°F**

Refer to Circuit/System Testing.

- **If greater than 154°C/300°F**

Refer to Circuit/System Testing.

- **If 154°C/300°F**

NOTE:

- **When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J 35616 GM-**

Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.

- **Testing for Step 8 is performed on the B109 Transfer Case Fluid Temperature Sensor using the GY probe J 35616-3.**

8. Test the resistance between the 5 V reference circuit, terminal A and the low reference circuit, terminal B. Refer to the Temperature Versus Resistance table below for the resistance values at various temperatures.

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

Replace the B109 Transfer Case Fluid Temperature Sensor.

- **If the resistance is within the specified range**

9. B109 Transfer Case Fluid Temperature Sensor OK.

Temperature Versus Resistance

Temp (°C/°F)	ohms	Nominal
-40/-40	95000-10600	100865
-20/-4	27000-3000	28582
0/32	9000-9800	9400
20/68	3400-3700	3500
30/86	2400-2100	2240
40/104	1400-1600	1465
50/122	1100-900	980
60/140	600-800	670
80/176	300-400	330
100/210	150-200	180

Repair Instructions

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

- **Control Module References** for K69 Transfer Case Control Module replacement, setup, and programming
- **Transfer Case Fluid Temperature Sensor Replacement**
- **Transfer Case Shift Control Module Scan Tool Information (BW 4474)** for Transfer Case Clutch Identifier Configuration/Reset function information

SYMPTOMS - TRANSFER CASE

Strategy Based Diagnostics

Review the system operation in order to familiarize yourself with the system functions. Refer to **Transfer Case Description and Operation**.

Visual/Physical Inspection

- Inspect the easily accessible or visible system components for obvious damage, or for conditions which could cause the symptom.
- Inspect the transfer case for the proper fluid. Refer to **Transfer Case Fluid Replacement**.

Symptom List

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

- **No Correction for Slip in All-Wheel Drive Mode**
- **Service All-Wheel Drive Indicator Always On**
- **All-Wheel Drive Off Indicator Always On**
- **Transfer Case Popping Noise**
- **Transfer Case Whine or Rumble Noise**
- **Transfer Case Clunk During Acceleration and Deceleration**
- **Transfer Case Leak Diagnosis**

NO CORRECTION FOR SLIP IN ALL-WHEEL DRIVE MODE

Diagnostic Instructions

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

Circuit/System Description

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

Diagnostic Aids

- Erratic wheel speed sensors can cause this condition to occur. Monitor the wheel speeds using the transfer case scan tool data list.
- Make sure system voltage is above 10.5 volts as Special Functions will not work correctly if the system is below this voltage.

Reference Information

Schematic Reference

All-Wheel Drive Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 Testing

1. Monitor the wheel speed sensors using the transfer case scan tool data list. If the wheel speeds are erratic or there is a large difference between front and rear then diagnose and repair as necessary. Check for EBCM DTCs as they have likely set for wheel speed performance.
2. While in a parking lot with a scan tool using transfer case special functions go to clutch coupling request and request 100%. Drive the vehicle while making sharp turns, if the vehicle binds on turns this indicates the system is working properly. If it does not bind on turns go to the next step.

IMPORTANT: This test is intended for short duration use for testing purposes, long term use of this function at 100% request may result in extensive damage to the front axle or other driveline components.

3. If nothing is found with wheel speed performance then the clutches may be excessively worn. Refer to **Transfer Case Disassemble**.
4. Repair as necessary.

Repair Instructions

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

Transfer Case Disassemble

SERVICE ALL-WHEEL DRIVE INDICATOR ALWAYS ON

Diagnostic Instructions

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

Circuit/System Description

If the service indicator needs to be turned on the transfer case shift control module sends a signal via the serial data line to the BCM which then sends a message to the instrument panel asking the I/P to command the Service AWD indicator.

Reference Information

Schematic Reference

All-Wheel Drive Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 Testing

1. If the Service AWD indicator is on and there are no DTCs, using a scan tool check under transfer case data list to see if the transfer case shift control module is requesting the service AWD indicator. If the module will not communicate check the fuse for the transfer case as this would cause the transfer case control module to drop off the serial data line causing a service indicator.
2. If the fuse is good check the module power and grounds for proper connections as this could cause the same thing as a blown fuse.
3. If this checks OK, then check all other U codes that may be set against the transfer case shift control

module such as I/P, BCM, PCM, and follow the proper U code diagnostic.

Repair Instructions

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

Control Module References for TCSCM replacement, setup, and programming.

ALL-WHEEL DRIVE OFF INDICATOR ALWAYS ON

Diagnostic Instructions

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

Circuit/System Description

If the AWD OFF Indicator needs to be turned on the transfer case shift control module sends a signal via the serial data line to the BCM which then sends a message to the instrument panel asking the I/P to command the AWD OFF Indicator. The AWD OFF Indicator is turned on for three reasons, the transfer case has overheated, the transfer case has lost both rear wheel speeds and vehicle speed, the transfer case has lost the front wheel speeds.

Reference Information

Schematic Reference

All-Wheel Drive Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 Testing

IMPORTANT: The instrument panel will display AWD OFF once 135°C (275°F) has been met or exceeded. The transfer case temperature sensor DTC will not set until 154°C (309°F) has been met.

1. Check for any transfer case DTCs and diagnose as necessary.
2. Check for any U codes which may indicate the reason why wheel speed or vehicle speeds are missing and diagnose as necessary using the U code diagnostics.
3. Using a scan tool under transfer case data list look at the transfer case oil temperature. If the temperature is at or above 135°C (275°F) determine that the vehicle is not being used beyond its design intent. If this is not the case then the overheat condition may be due to excessively slipping clutches. Allow the transfer case to cool and retest. If the condition persists then disassemble the transfer case and repair as necessary. If an overheating issue is not present go to the next step.
4. Check the ECM and EBCM for DTCs as these modules will likely have set DTCs due to faulty wheel or vehicle speeds. Follow the proper diagnostics and repair as necessary.

Repair Instructions

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

Transfer Case Disassemble

TRANSFER CASE POPPING NOISE

Transfer Case Popping Noise

Cause	Correction
DEFINITION: A faulty AWD system component or internal transfer case component that causes a LIGHT popping noise WHEN engaging-into or disengaging-out-of AWD. Review the <u>Symptoms - Transfer Case</u> and perform the necessary inspections.	
1. Compare the noise to a similar vehicle to see if a normal condition. 2. Identify the source of the noise using chassis ears and refer to the appropriate service manual section. 3. Note specifics such as when the noise is present. 4. Note if the noise is relative to vehicle speed, is noisy on turns, or other specifics. 5. If the source of the noise is the transfer case, inspect for the correct fluid level. 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.	
Transmission Or Transfer Case Mounts Loose Or Damaged	Repair or replace the mounts as required.
	NOTE:

Propeller Shaft Loose Or Damaged	A popping noise that increases as vehicle speed increases may be caused by a loose or damage propeller shaft. Inspect and repair the propeller shaft as required.Refer to <u>Symptoms - Propeller Shaft</u> .
Suspension Components Worn	Replace the suspension components as required. Refer to <u>Front Wheel Drive Shaft Replacement - Right Side</u> , <u>Front Wheel Drive Shaft Replacement - Left Side</u> , and <u>Rear Wheel Drive Shaft Replacement (LFX,LF3)</u> , <u>Rear Wheel Drive Shaft Replacement (LTG)</u> .
Front Or Rear Axle Noise	NOTE: • A popping noise that increases as vehicle speed increase may be caused by worn axle bearings or other internal axle components. • To determine if the noise is front axle related, remove the front propeller shaft and retest. Repair or replace the axle as required.Refer to <u>Symptoms - Front Drive Axle</u> , or <u>Symptoms - Rear Drive Axle</u> .
Transmission Rear Output Shaft Bearing Worn	NOTE: A popping noise that increases as transmission output shaft speed increases may be caused by a worn transmission output shaft bearing or other internal transmission components. Repair or replace the transmission as required.Refer to <u>Symptoms - Automatic Transmission</u> .

TRANSFER CASE WHINE OR RUMBLE NOISE

Transfer Case Whine or Rumble Noise

Cause	Correction
Definition: a faulty AWD system component or internal transfer case component that causes a whine or rumble noise. 1. Compare the noise to a similar vehicle to see if a normal condition. 2. Identify the source of the noise using chassis ears and refer to the appropriate service manual section. 3. Note specifics such as when the noise is present. 4. Note if the noise relative to vehicle speed, is noisy on turns, or other specifics. 5. If the source of the noise is the transfer case, inspect for the correct fluid level. 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. Review the <u>Symptoms - Transfer Case</u> and perform the necessary inspections.	

Propeller Shaft Loose Or Damaged	NOTE: A whine or rumble noise that increases as vehicle speed increases may be caused by a loose or damage propeller shaft . Inspect and repair the propeller shaft as required.Refer to <u>Symptoms - Propeller Shaft</u> .
Tire Pressure Uneven	NOTE: A whine or rumble noise that occurs when performing slow speed turns in AWD may be caused by low or uneven tire pressure. 1. Check the tire pressure and adjust as required to the value recommended by the label on the vehicle. 2. Road test the vehicle
Tire Noise	NOTE: A whine or rumble noise that increases as vehicle speed increases may be caused by tires with an uneven wear condition or of different sizes. 1. Reference the vehicle owner's manual and inspect for the correct size tires in the correct locations. Refer to Owner's Manual. 2. Inspect the tires for excessive or uneven wear. 3. Rotate or substitute tires and retest. Refer to <u>Tire and Wheel Inspection</u> .
Front Or Rear Axle Bearings Worn	NOTE: • A whine or rumble noise that increases as vehicle speed increases may be caused by worn axle bearings. • To determine if the noise is front axle related, remove the front propeller shaft and retest. Repair or replace the axle as required.Refer to <u>Front Wheel Drive Shaft Replacement - Right Side</u> , <u>Front Wheel Drive Shaft Replacement - Left Side</u> , and <u>Rear Wheel Drive Shaft Replacement (LFX,LF3)</u> , <u>Rear Wheel Drive Shaft Replacement (LTG)</u> .
Transmission Rear Output Shaft Bearing Worn	NOTE: A whine or rumble noise that increases as transmission output shaft speed increases may be caused by a worn transmission output shaft bearing or other internal transmission components. Repair or replace the transmission as required.Refer to <u>Symptoms - Automatic Transmission</u> .

Transfer Case Fluid Level Low	NOTE: A whine or rumble noise that increases as transmission output shaft speed increases may be caused by a low transfer case fluid level. Fill the transfer case to the correct fluid level and retest.
Transfer Case Bearings Worn	NOTE: A whine or rumble noise that increases as transmission output shaft speed increases may be caused by a worn transfer case internal bearing. Replace the bearings as required. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>.
Transfer Case Gear Wear Or Gear Damage	NOTE: A slight whine noise that occurs a 35-40 mph should be considered normal. Compare to another similar vehicle. NOTE: Normal transfer case noise can be described as a slight noise heard only at a certain speed or under unusual or remote conditions. For example, the noise tends to reach a peak at speeds from 56-64 km/h (35-40 mph) depending on road and load conditions, or on gear ratio and tire size. This slight noise is in no way indicative of trouble in the transfer case assembly. 1. Test drive and compare to a similar vehicle to determine if this is a normal operating condition. 2. Repair or replace the transfer case as required. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>.

TRANSFER CASE CLUNK DURING ACCELERATION AND DECELERATION

Transfer Case Clunk During Acceleration and Deceleration

Cause	Correction
Definition: during acceleration or deceleration, a clunk is heard or felt within the awd system or within the transfer case. 1. Compare the noise to a similar vehicle to see if a normal condition. 2. Identify the source of the noise using chassis ears and refer to the appropriate service manual section 3. Note specifics such as when the noise is present. 4. Note if the noise is relative to vehicle speed, is noisy on turns, or other specifics. 5. If the source of the noise is the transfer case, inspect for the correct fluid level. 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.

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 Loose Or Damaged	NOTE: A clunk noise that is heard during acceleration or deceleration may be caused by a loose or damage propeller shaft. Inspect and repair the propeller shaft as required. Refer to Symptoms - Propeller Shaft .
Transfer Case Fluid Level Low	NOTE: A clunk noise that is heard during acceleration or deceleration may be caused by a low transfer case fluid level and clutch pack slippage. Fill the transfer case to the correct fluid level and retest.
Clutch Pack Noise	NOTE: A shudder or binding type noise when awd is engaging or disengaging may indicate worn clutch pack friction discs. Disassemble the transfer case and inspect the clutch pack for worn components. Replace the clutch pack assembly and reprogram the transfer case control module as required. Refer to Transfer Case Shift Control Module Programming and Setup (BW 4474)

TRANSFER CASE LEAK DIAGNOSIS

Transfer Case Leak Diagnosis

Cause	Correction
DEFINITION: A visible indication of an external fluid leak from the transfer case. Review the Symptoms - Transfer Case and perform the necessary inspections. See below for suggested diagnostic method(s).	
Special Tools GE 28431-6 Fluorescent Oil Dye GE 28428-E High Intensity Black Light Kit For equivalent regional tools, refer to Special Tools .	
Fluorescent Dye Method 1. Add GE 28431-6 Fluorescent dye to the transmission or transfer case to determine the source of the leak. 2. Operate the vehicle. 3. Inspect for the presence of dye within the oil leak using the GE 28428-E High Intensity Black	

Light Kit. A presence or non-presence of dye within the oil leak will indicate which component is the source of the leak.

Powder Method

CAUTION:

Do not clean using brake cleaner or other reactive solvents as these solvents can damage rubber gaskets, seals and bushings.

1. Thoroughly clean the suspected leak area using a rag.
2. Apply an aerosol type leak tracing powder to the suspected leak area.

NOTE:

Do not drive the vehicle on the freeway as this will splatter oil inhibiting leak diagnosis.

3. Operate the vehicle for 15-20 minutes under city driving conditions until normal operating temperatures are reached.
4. Shut OFF the engine.
5. Inspect the suspected leak area.
6. Trace the leak path through the powder in order to find the source of the leak.

Transmission-to-Transfer Case
Weep Hole Leak

NOTE:

Transmission fluid is sealed at the rear of the transmission by the transmission rear output shaft seal. Transfer case fluid is sealed at the front of transfer case by the transfer case input shaft seal. If a leak is present at the weep hole area of the transmission-to-transfer case adapter, fluorescent dye must be added to one of the two components to determine the source of the leak.

1. Inspect for a restricted vent hose assembly. Repair as required.
2. Add J-28431-6 Fluorescent dye to the transmission to determine the source of the leak.
3. Operate the vehicle.
4. Inspect the weep hole area for a fluid leak and for traces of dye within the oil using the J-42220 High intensity black light kit.
5. If fluorescent dye is present within the fluid leak, replace the transmission rear output shaft seal.
6. If fluorescent dye is not present within the fluid leak, replace the transfer case input shaft oil seal.

Refer to **Transfer Case Disassemble**, and **Transfer Case Assemble**.

Transmission Vent Hose Leak

1. Inspect for a loose, disconnected, restricted, or damaged transmission vent hose assembly.
2. Replace components as required.

Oil Drain Plug or Oil Fill Plug Leak	1. Inspect for an under-tightened oil fill plug, a damaged fill plug seal, or damage to the rear case half sealing surface 2. Inspect for an under-tightened drain plug or incorrect type or missing sealant on the drain plug threads. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers.</u> 3. Replace the oil fill plug if seal damage is present and tighten to the correct torque value. 4. Install the correct sealer onto the threads of the oil drain plug and tighten to the correct torque value. Refer to <u>Transfer Case Fluid Replacement.</u>
Oil Temperature Sensor Leak	1. Remove the oil temperature sensor. Refer to <u>Transfer Case Fluid Temperature Sensor Replacement.</u> 2. Inspect for the following conditions: • Sensor cross threaded into the housing • Damage to the sensor seal • Sensor over tightened causing deformation of the sensor • Damage to the case half sealing surface 3. Replace components as required.
Rear Output Shaft Oil Seal Leak	1. Inspect for a leaking rear output shaft oil seal. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble.</u> 2. Inspect the rear output flange sealing surface for excessive wear, rust, or other damage. Minor abrasions may be repaired using very fine emery cloth sandpaper. 3. Replace components as required.
Oil transfer tube and or transfer tube fitting leak	1. Inspect for a leaking oil transfer tube or transfer tube fittings. 2. Replace components as required. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble.</u>
	1. Inspect for a restricted vent hose assembly. Repair as required. 2. Inspect for a leaking front output shaft oil seal. Refer to Transmission-to-Transfer Case Adapter Weep Hole Leak in this table.

Front Output Shaft Oil Seal Leak	Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>. 3. Inspect the front output flange sealing surface for excessive wear, rust, or other damage. Minor abrasions may be repaired using very fine emery cloth sandpaper. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>. 4. Replace components as required.
Oil pump cover leak	1. Inspect for an incorrect low torque value on the oil pump cover bolts. Refer to <u>Fastener Tightening Specifications</u>. 2. Inspect for a leaking oil pump cover O-ring seal. 3. Inspect for a damage case half or cover sealing surfaces. 4. Replace components as required.
Clutch Coil O-ring Seal Leak	NOTE: The clutch coil has an O-ring seal at each coil stud and coil wire location. 1. Inspect the rear case half at the clutch coil locations. 2. Replace the clutch coil assembly as required.
Front case half-to-rear case half seam leak	Disassemble the transfer case and Reseal the case halves. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>.
Case leak	1. Inspect for a cracked case half or porosity. 2. Add J-28431-6 fluorescent Dye to the transfer case. 3. Operate the vehicle. 4. Inspect the location of the leak for presence of dye within the oil using the J-28428-E High Intensity Black Light Kit. 5. Replace components as required. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>.

REPAIR INSTRUCTIONS - ON VEHICLE

TRANSFER CASE FLUID REPLACEMENT

Removal Procedure

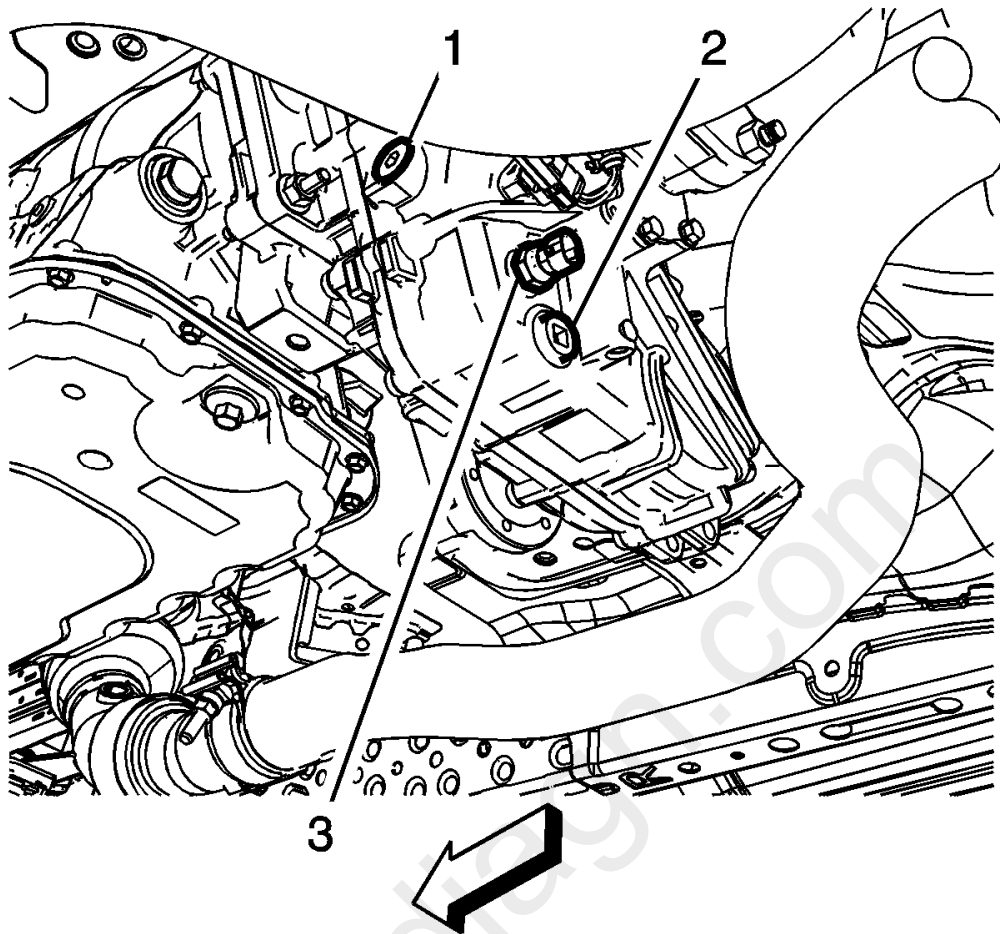


Fig. 4: Transfer Case Drain And Fill Plugs
Courtesy of GENERAL MOTORS COMPANY

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

1. Raise and suitably support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Reposition the underbody insulation as necessary to gain access to the fill plug.
3. Remove the fill plug (1).
4. Remove the drain plug (2).

NOTE: Ensure that an approved drain pan is used when draining the transfer case.

5. Allow the transfer case to drain completely.

Installation Procedure

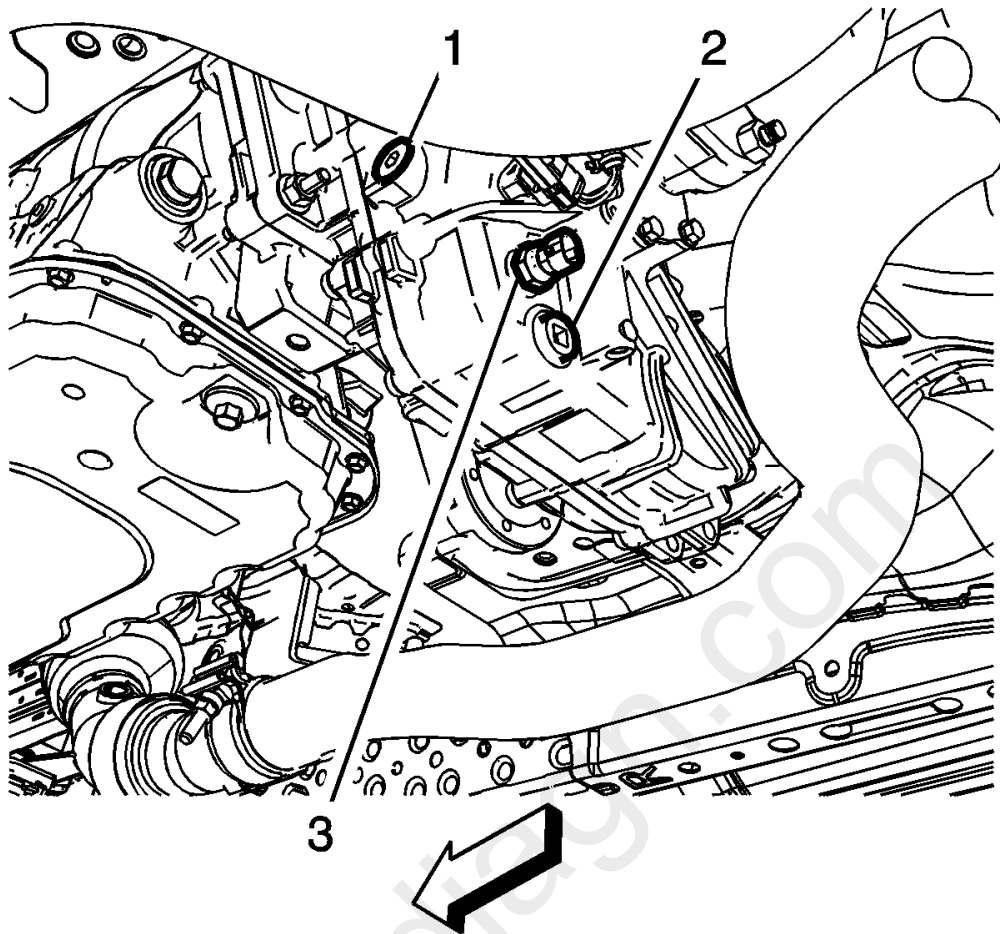


Fig. 5: Transfer Case Drain And Fill Plugs
Courtesy of GENERAL MOTORS COMPANY

1. Apply sealant to the threads of the drain plug. Refer to Adhesives, Fluids, Lubricants, and Sealers.

CAUTION: Refer to Component Fastener Tightening Caution .

2. Install the drain plug (2) and tighten to 25 (18 lb ft).
3. Fill the transfer case to the bottom of the fill plug hole. Refer to Adhesives, Fluids, Lubricants, and Sealers.
4. Apply sealant to the threads of the fill plug. Refer to Adhesives, Fluids, Lubricants, and Sealers.
5. Install the fill plug (1) and tighten to 15 (11 lb ft).
6. Lower the vehicle.

DRAIN PLUG REPLACEMENT

Removal Procedure

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

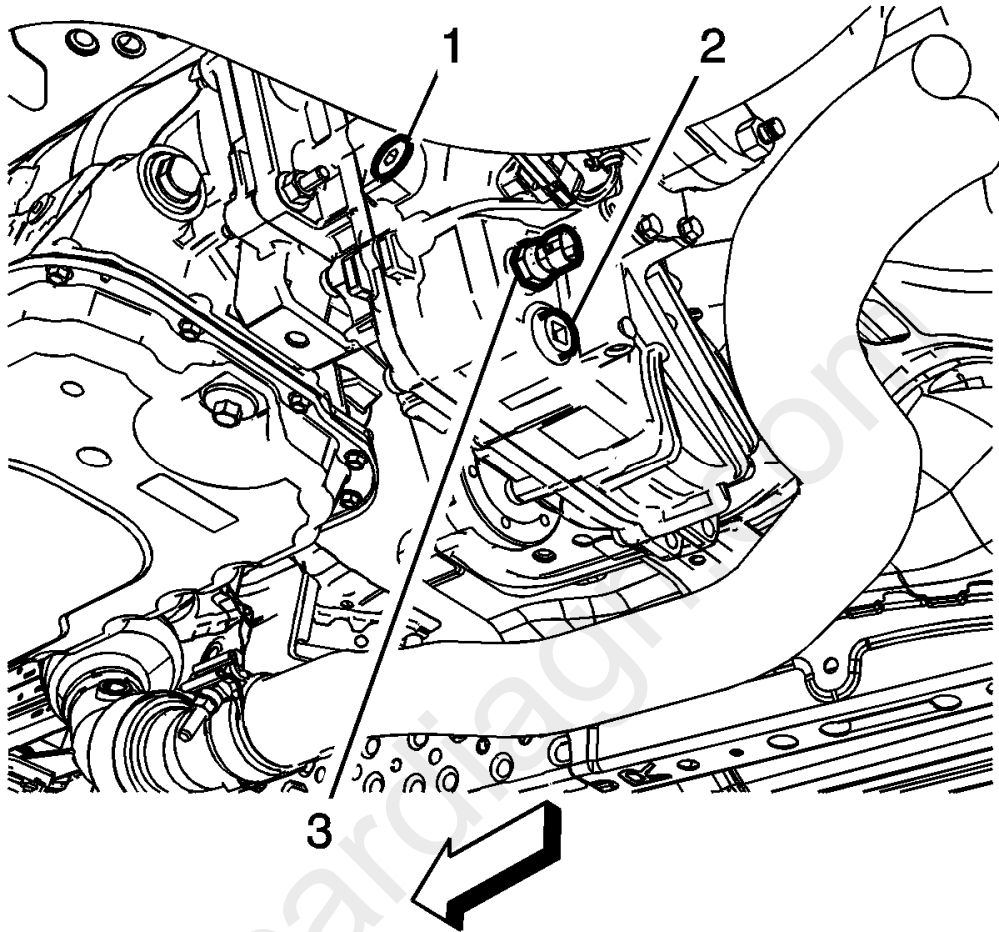


Fig. 6: Transfer Case Drain And Fill Plugs
Courtesy of GENERAL MOTORS COMPANY

2. Remove the drain plug (2).

Installation Procedure

1. Apply sealant to the threads of the drain plug. Refer to Adhesives, Fluids, Lubricants, and Sealers.

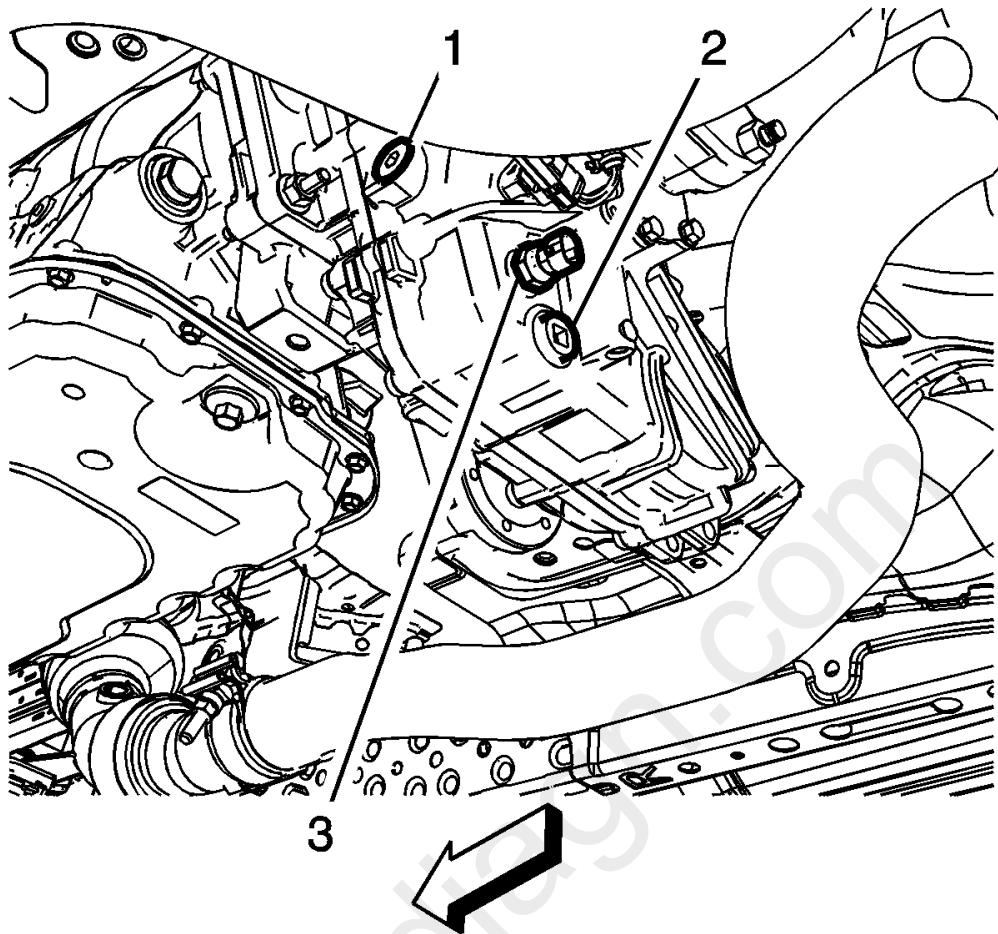


Fig. 7: Transfer Case Drain And Fill Plugs
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the drain plug (2) and tighten to 25 (18 lb ft)
3. Fill to the transfer case with fluid. Refer to Transfer Case Fluid Replacement.
4. Lower the vehicle.

FILL PLUG REPLACEMENT

Removal Procedure

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

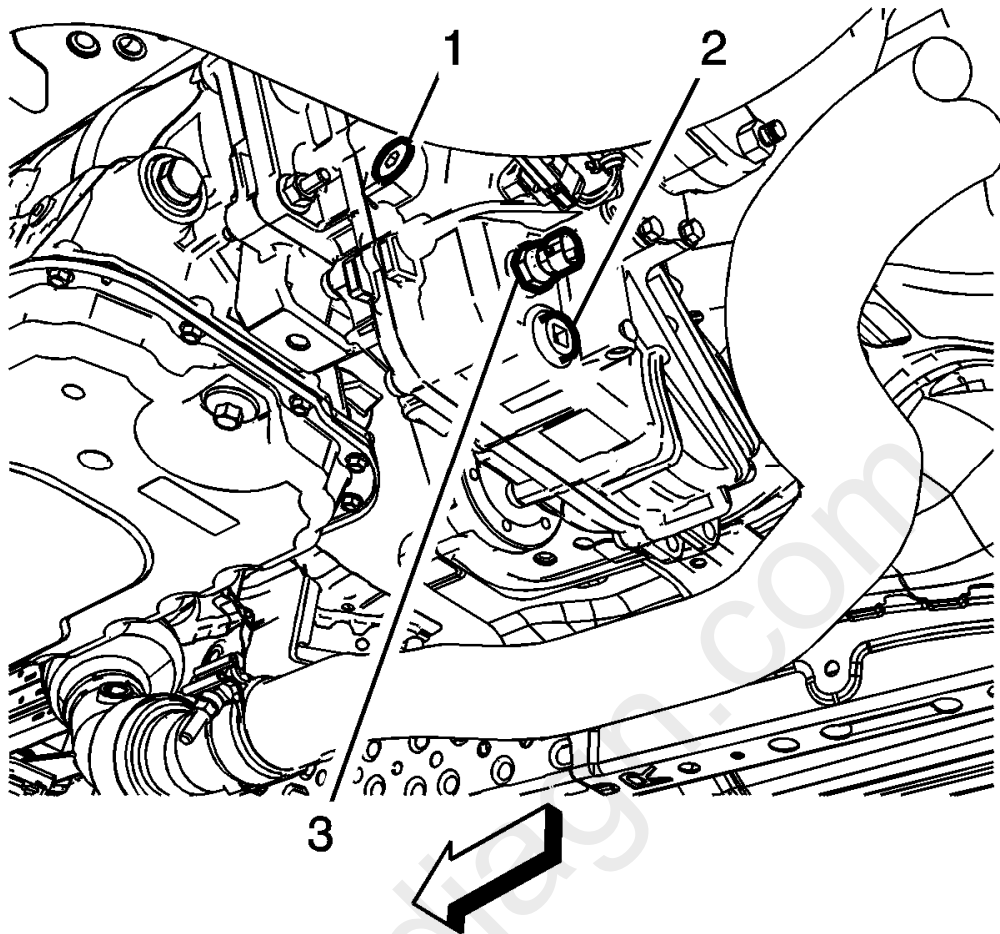


Fig. 8: Transfer Case Drain And Fill Plugs
Courtesy of GENERAL MOTORS COMPANY

2. Remove the fill plug (1).

Installation Procedure

1. Fill the transfer case as necessary. Refer to **Transfer Case Fluid Replacement.**
2. Apply sealant to the threads of the fill plug. Refer to **Adhesives, Fluids, Lubricants, and Sealers.**

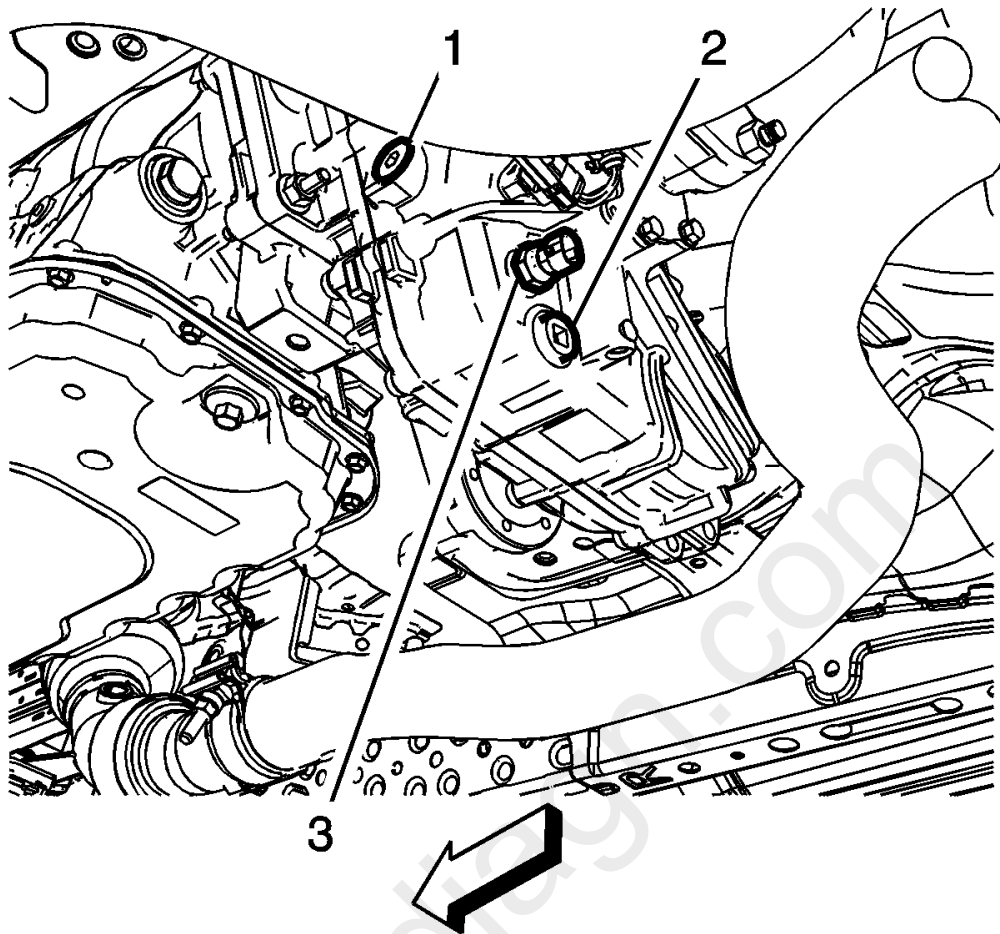


Fig. 9: Transfer Case Drain And Fill Plugs
Courtesy of GENERAL MOTORS COMPANY

3. Install the fill plug (1) and tighten to 15 (11 lb ft).
4. Lower the vehicle.

TRANSFER CASE FLUID TEMPERATURE SENSOR REPLACEMENT

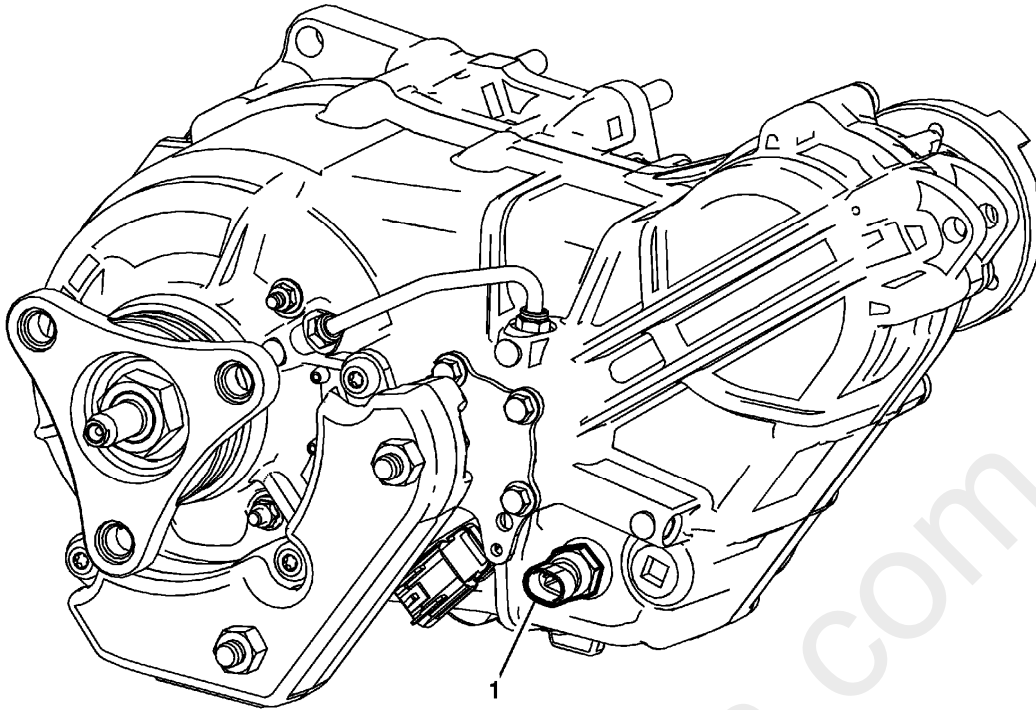


Fig. 10: Transfer Case Fluid Temperature Sensor
 Courtesy of GENERAL MOTORS COMPANY

Transfer Case Fluid Temperature Sensor Replacement

Callout	Component Name
Preliminary Procedure	
Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
	Transfer Case Fluid Temperature Sensor
	CAUTION: Refer to <u>Component Fastener Tightening Caution</u> .
	Procedure
1	1. Disconnect the electrical connector from the transfer case fluid temperature sensor. 2. Place a drain pan under the transfer case fluid temperature sensor. 3. After sensor replacement, refill the transfer case with fluid. Refer to <u>Transfer Case Fluid Replacement</u>.
	Tighten 22 (16 lb ft)

TRANSFER CASE SHIFT CONTROL MODULE REPLACEMENT

Removal Procedure

1. Remove the right rear compartment side trim panel. Refer to **Rear Compartment Side Trim Replacement - Right Side** .
2. Remove the electrical connectors from the transfer case shift control module.

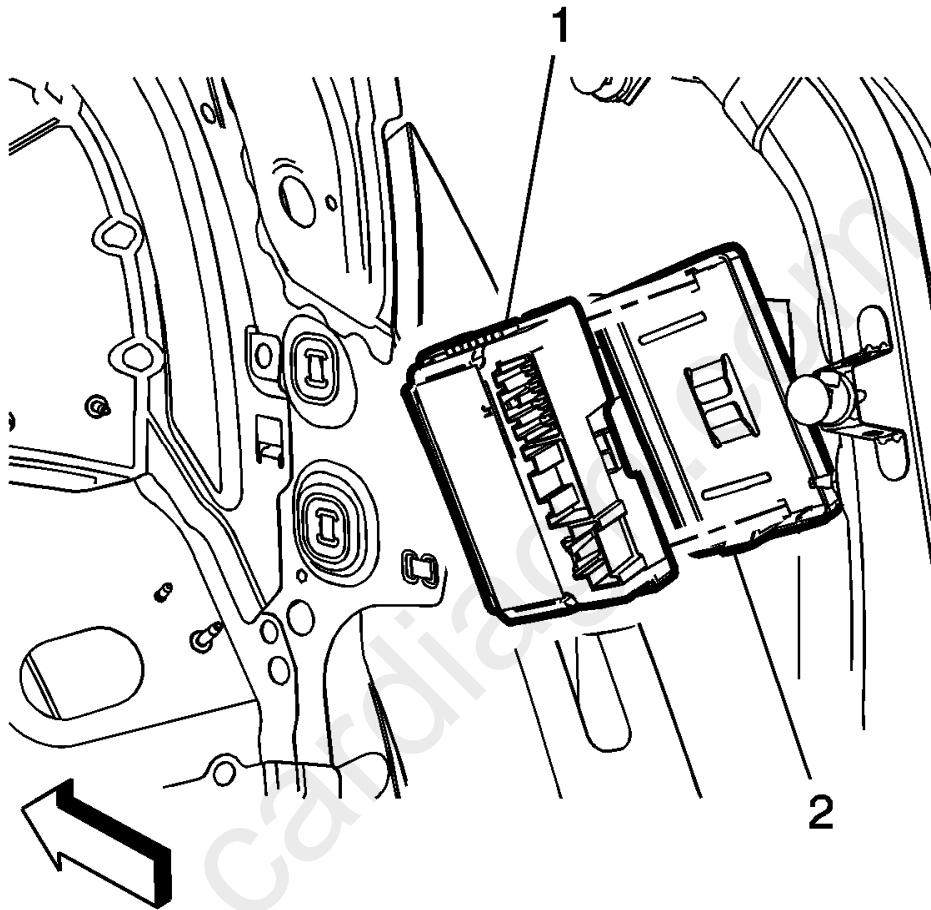


Fig. 11: Transfer Case Shift Control Module
Courtesy of GENERAL MOTORS COMPANY

3. Remove the transfer case shift control module (1) from the bracket.

Installation Procedure

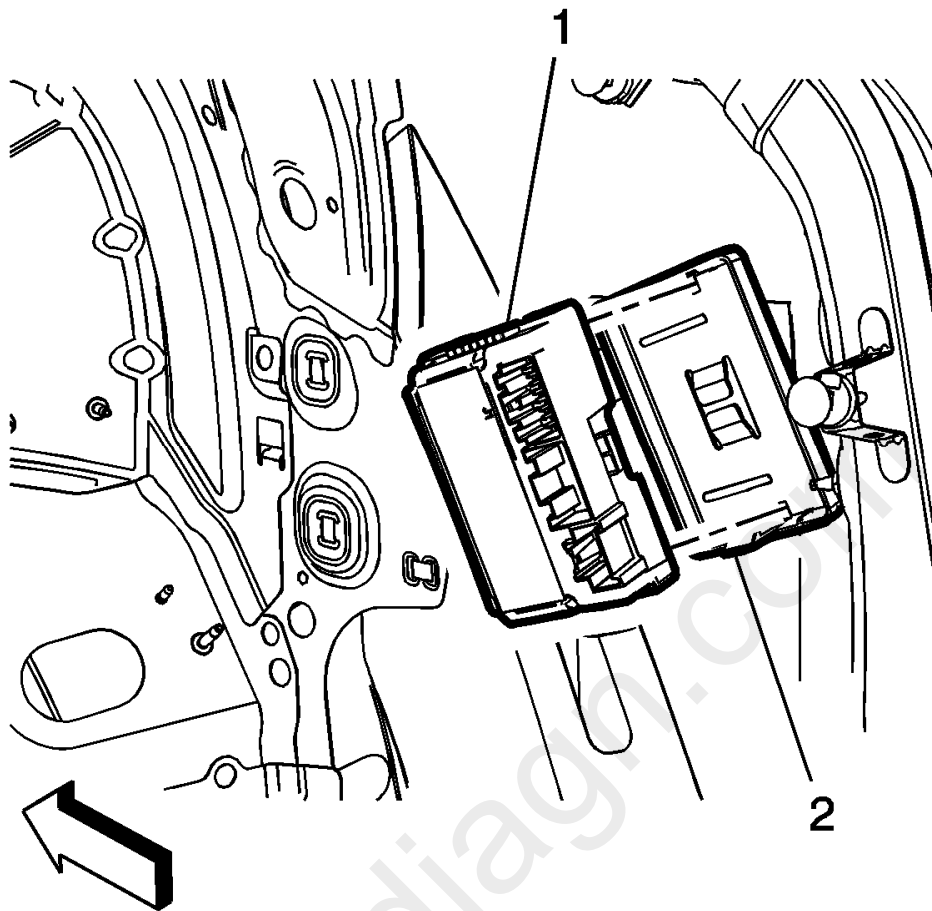


Fig. 12: Transfer Case Shift Control Module
 Courtesy of GENERAL MOTORS COMPANY

1. Install the transfer case shift control module (1) to the bracket.
2. Install the electrical connectors to the transfer case shift control module.
3. Install the right rear compartment side trim panel. Refer to **Rear Compartment Side Trim Replacement - Right Side** .
4. Refer to control module references for programming and setup. Refer to **Control Module References** .

TRANSFER CASE ASSEMBLY REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the transfer case fluid, if necessary. Refer to **Transfer Case Fluid Replacement**.
3. Remove the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .
4. Remove the propeller shaft. Refer to **Two-Piece Propeller Shaft Replacement (LFX, LF3)** , **Two-Piece Propeller Shaft Replacement (LTG, LCV, LKW)** .

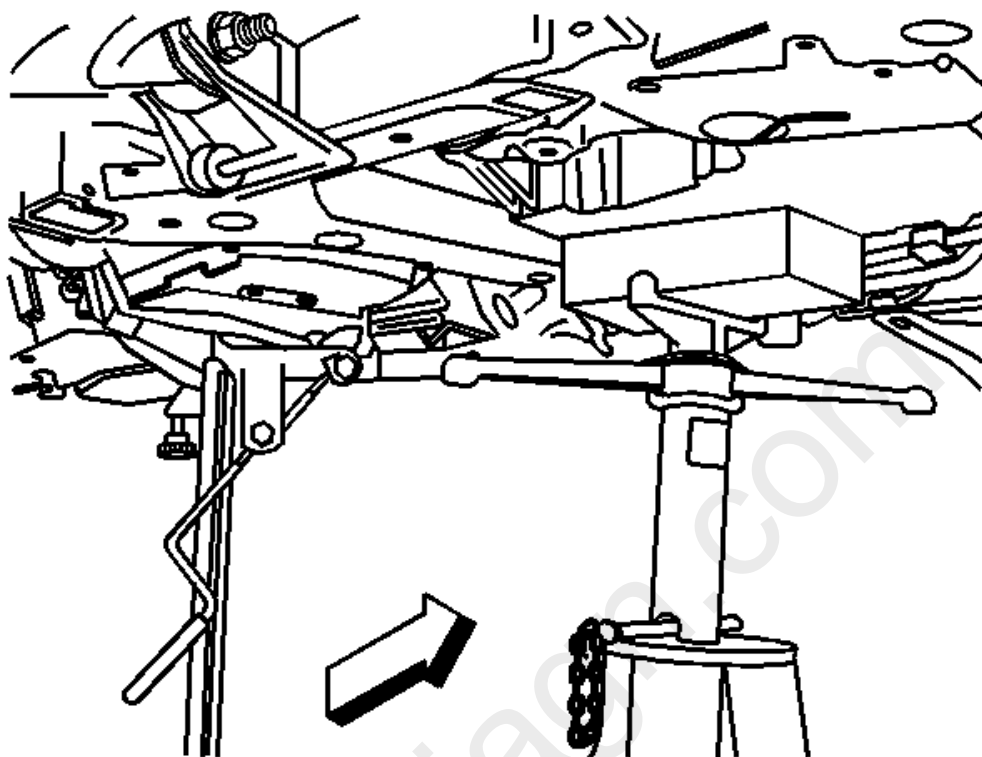


Fig. 13: Supporting Transmission With Jack & Block Of Wood
Courtesy of GENERAL MOTORS COMPANY

5. Support the transmission with a suitable jack.
6. Disconnect the electrical connectors from the transfer case.

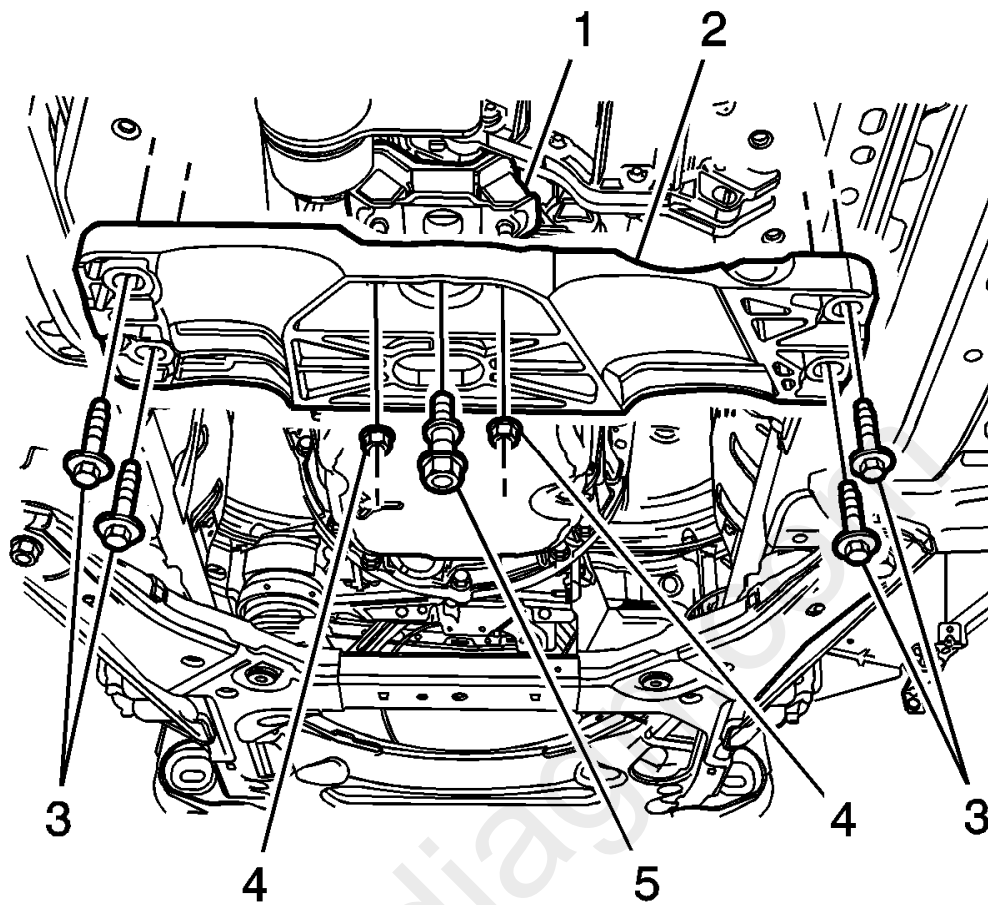


Fig. 14: Identifying Transmission Support, Restrictor And Retaining Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the transmission support assembly (2) from the vehicle. Refer to **Transmission Support Replacement (RWD)** , **Transmission Support Replacement (AWD)** .
8. Using the jack, lower the transmission enough to access the rear transfer case mounting fasteners.
9. Using a suitable transmission jack, support the transfer case.
10. Using suitable straps or chains, secure the transfer case to the transmission jack.

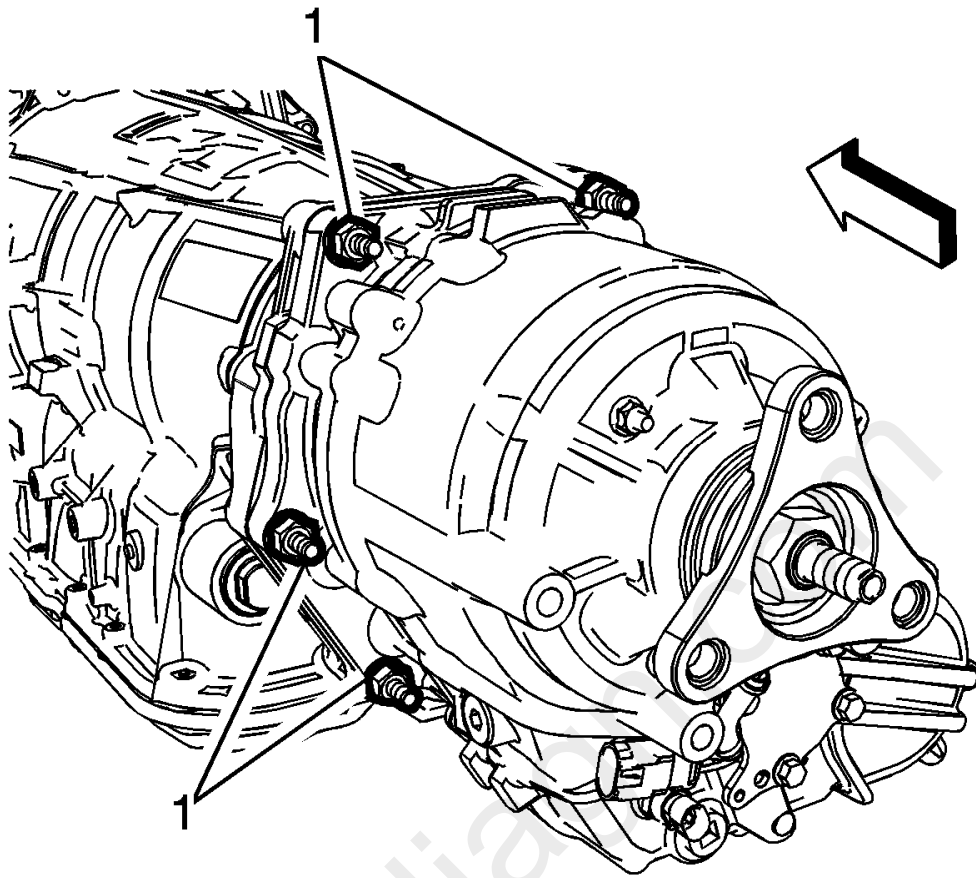


Fig. 15: Four Rear Transfer Case Mounting Fasteners
Courtesy of GENERAL MOTORS COMPANY

11. Remove the four rear transfer case mounting fasteners (1).

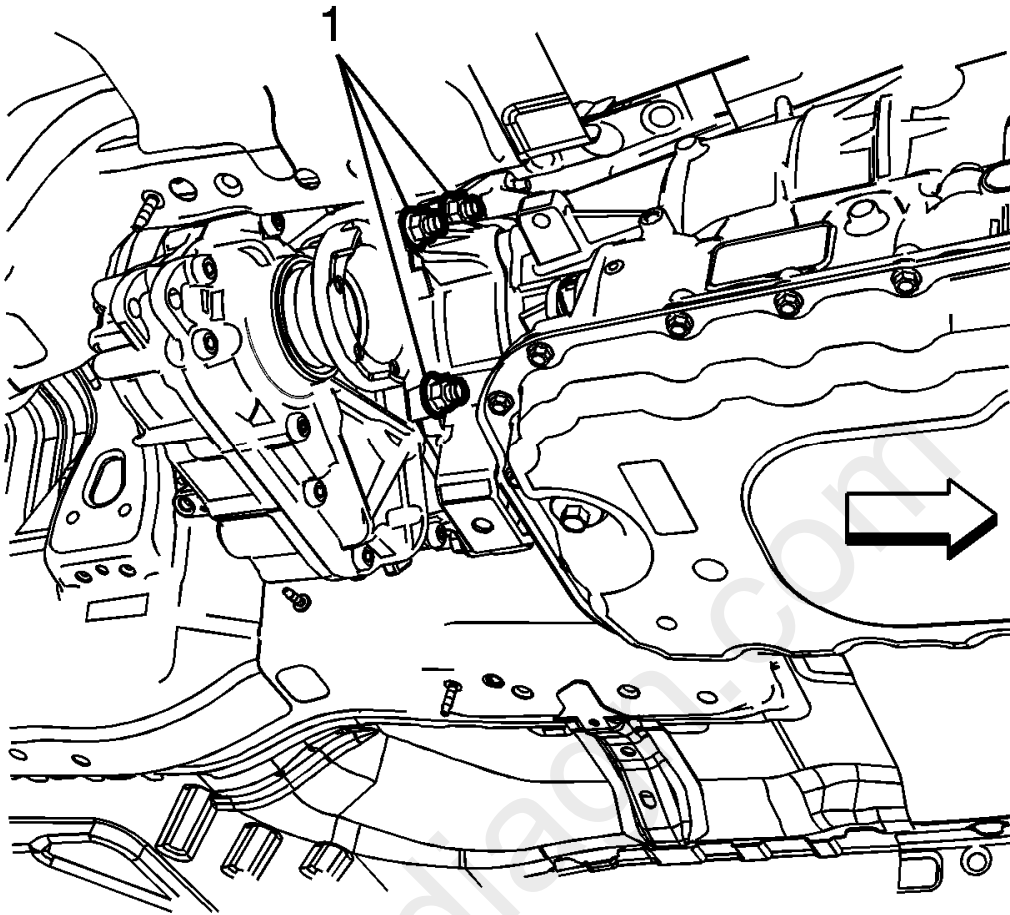


Fig. 16: Three Front Transfer Case Mounting Fasteners
Courtesy of GENERAL MOTORS COMPANY

12. Remove the three front transfer case mounting fasteners (1).
13. Lower the transfer case out of the vehicle.
14. Remove and DISCARD the vehicle wiring harness bracket located on the top of the transfer case assembly.

Installation Procedure

1. Install the NEW vehicle wiring harness bracket located on the top of the transfer case assembly.
2. Position the transfer case to the transmission.

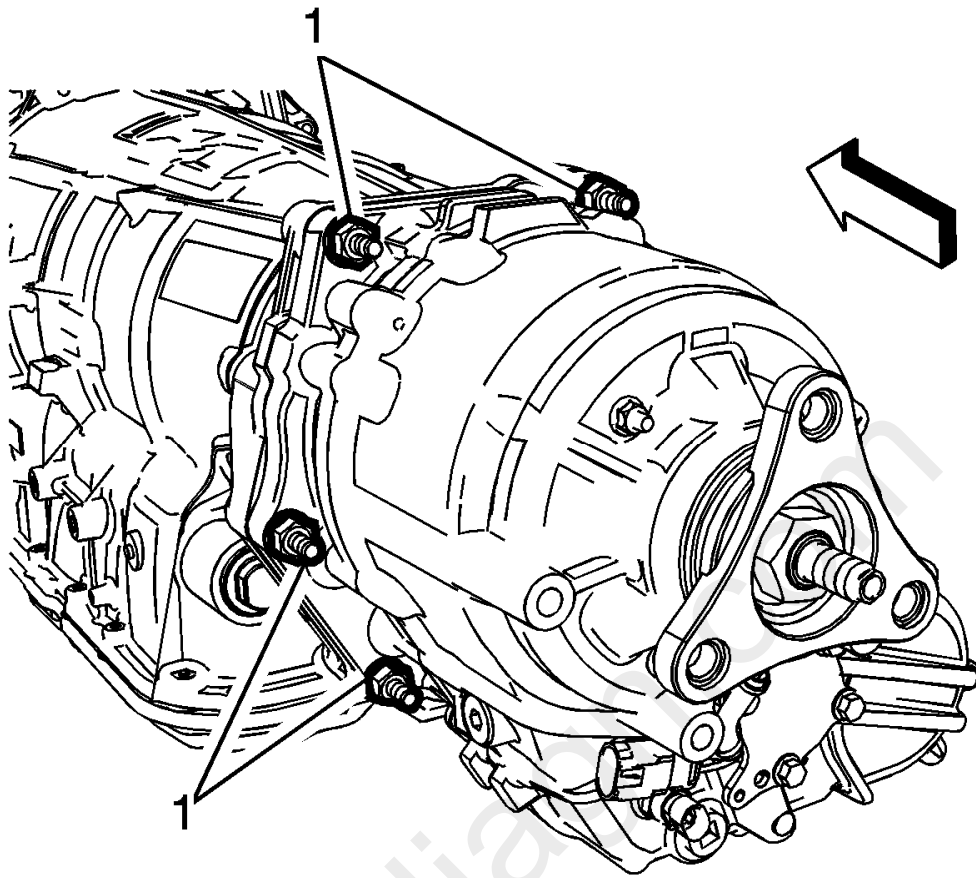


Fig. 17: Four Rear Transfer Case Mounting Fasteners
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the transfer case fasteners (1) and tighten to 50 (37 lb ft).

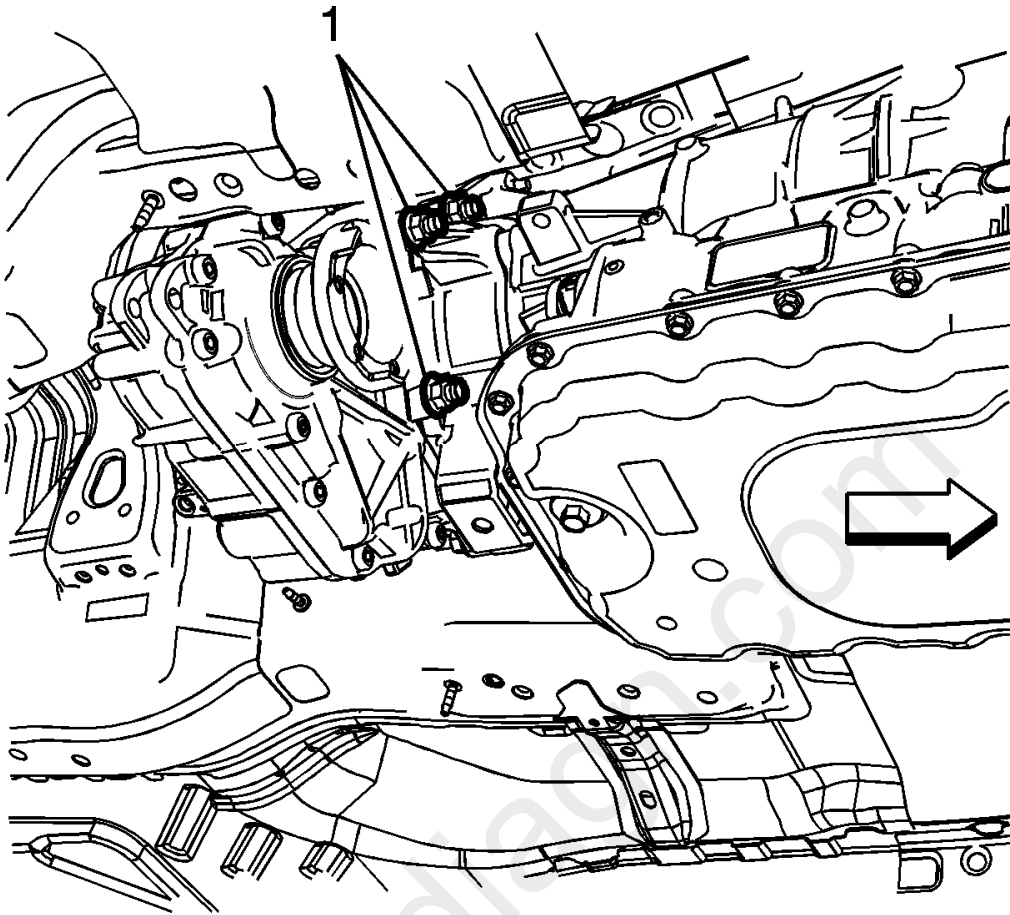


Fig. 18: Three Front Transfer Case Mounting Fasteners
Courtesy of GENERAL MOTORS COMPANY

4. Install the transfer case fasteners (1) and tighten to 50 (37 lb ft).
5. Install the transmission support assembly. Refer to **Transmission Support Replacement (AWD)** .
6. Remove the transmission jack from the transfer case.
7. Remove the jack from under the transmission.
8. Connect the electrical connectors to the transfer case.
9. Connect the shift cable to the transmission control lever. Refer to **Range Selector Lever Cable Replacement** .
10. Install the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .
11. Install the propeller shaft. Refer to **Two-Piece Propeller Shaft Replacement (LFX, LF3)** , **Two-Piece Propeller Shaft Replacement (LTG, LCV, LKW)** .
12. Refill the transfer case with fluid, if necessary. Refer to **Transfer Case Fluid Replacement**.
13. Lower the vehicle.
14. Reprogram the transfer case shift control module. Refer to **Control Module References** .

INPUT SHAFT SEAL REPLACEMENT

Removal Procedure

1. Remove the transfer case. Refer to **Transfer Case Assembly Replacement**.
2. Remove the input shaft seal. Refer to input shaft seal removal in **Transfer Case Disassemble**.

Installation Procedure

1. Install the input shaft seal. Refer to input shaft seal installation in **Transfer Case Assemble**.
2. Install the transfer case. Refer to **Transfer Case Assembly Replacement**.

REAR OUTPUT SHAFT SEAL REPLACEMENT

Tools Required

- **J-41736** Bearing Installer
- **J-45012** Holding Fixture
- **J-45019** Flange and Pinion Cage Remover
- **DT-49861-A** Seal Installer
- For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the propeller shaft. Refer to **Two-Piece Propeller Shaft Replacement (LFX, LF3)** , **Two-Piece Propeller Shaft Replacement (LTG, LCV, LKW)** .

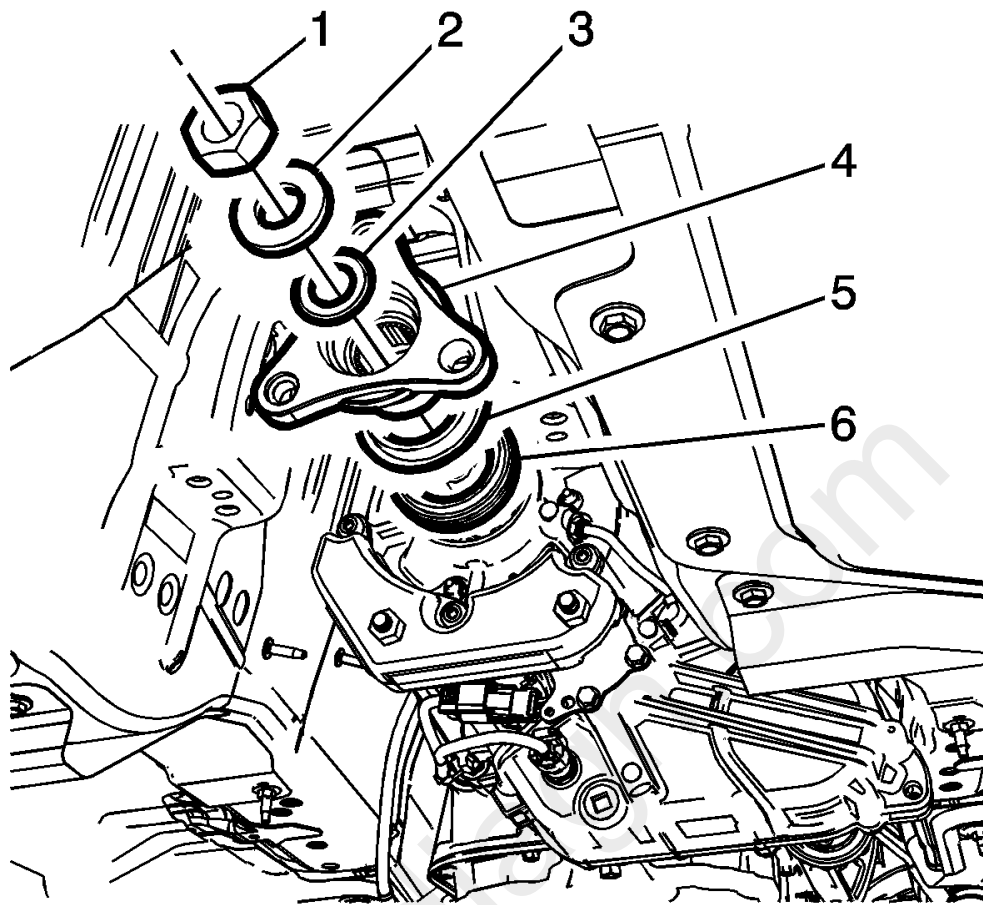


Fig. 19: Rear Output Shaft Flange
Courtesy of GENERAL MOTORS COMPANY

NOTE: Use M10 x 1.5 mm nuts and bolts to retain the tool to the flange.

3. Install the **J-45012** Holding Fixture to the rear output shaft flange (4).
4. Remove the rear output shaft flange nut (1).
5. Remove the **J-45012** Holding Fixture from the rear output shaft flange (4).
6. Remove the rear output shaft flange washer (2).
7. Remove and Discard the rear output shaft flange O-ring seal (3).
8. Install the **J-45019** Flange and Pinion Cage Remover to the rear output shaft flange (4).

CAUTION: Refer to Machined Surface Damage Caution .

9. Remove the rear output shaft seal dirt deflector (5).

10. Remove and Discard the rear output shaft seal (6).

Installation Procedure

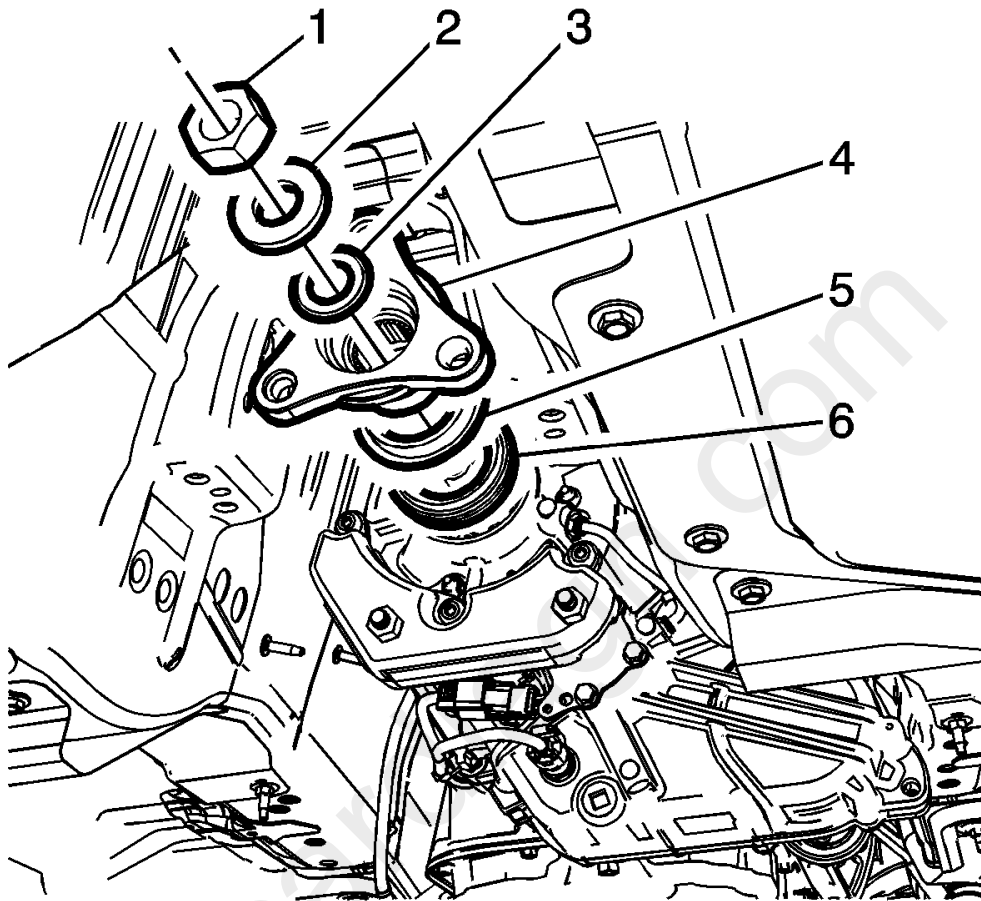


Fig. 20: Rear Output Shaft Flange
Courtesy of GENERAL MOTORS COMPANY

1. Install a NEW seal using **DT-49861-A** Seal Installer.
2. Install the rear output shaft seal dirt deflector (5) using **J-41736** Bearing Installer.

NOTE: Use M10 x 1.5 mm nuts and bolts to retain the tool to the flange.

3. Install the **J-45012** Holding Fixture to the rear output shaft flange (4).
4. Install the NEW rear output shaft flange O-ring seal (3).
5. Remove the rear output shaft flange washer (2).

CAUTION: Refer to Fastener Caution .

6. Install the rear output shaft flange nut (1) and tighten to 160 (118 lb ft)
7. Install the propeller shaft. Refer to **Two-Piece Propeller Shaft Replacement (LFX, LF3)** , **Two-Piece Propeller Shaft Replacement (LTG, LCV, LKW)** .
8. Check the fluid level. Add fluid, if necessary. Refer to **Transfer Case Fluid Replacement**.
9. Lower the vehicle.

FRONT OUTPUT SHAFT SEAL REPLACEMENT

Tools Required

- **J-2619-A** Slide Hammer w/Adapter
- **J-45019** Flange and Pinion Cage Remover
- **J-47847** Output Seal Installer
- For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .

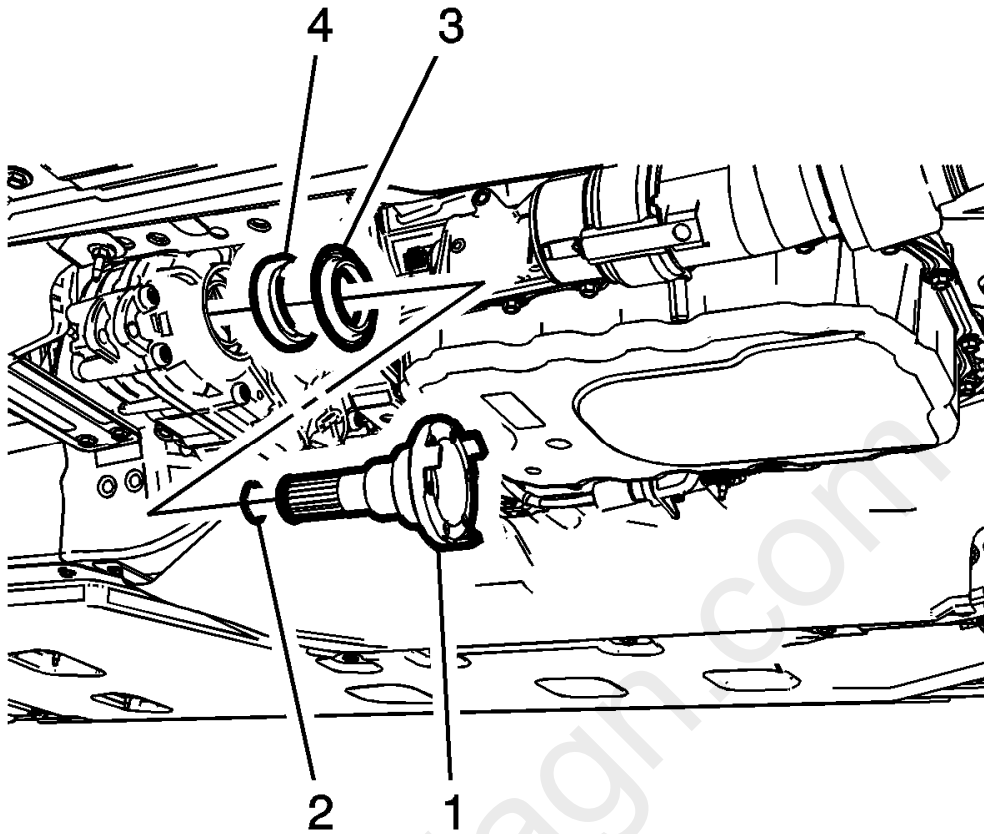


Fig. 21: Front Output Shaft
Courtesy of GENERAL MOTORS COMPANY

3. Remove the front output shaft (1) using **J-2619-A** Slide Hammer w/Adapter and **J-45019** Flange and Pinion Cage Remover with three M8 x 1.25 mm bolts to retain the adapter to the flange of the shaft.
4. Remove and DISCARD the front output shaft retaining ring (2).

CAUTION: Refer to Machined Surface Damage Caution .

5. Remove the front output shaft seal dirt deflector (3).
6. Remove the front output shaft seal (4).

Installation Procedure

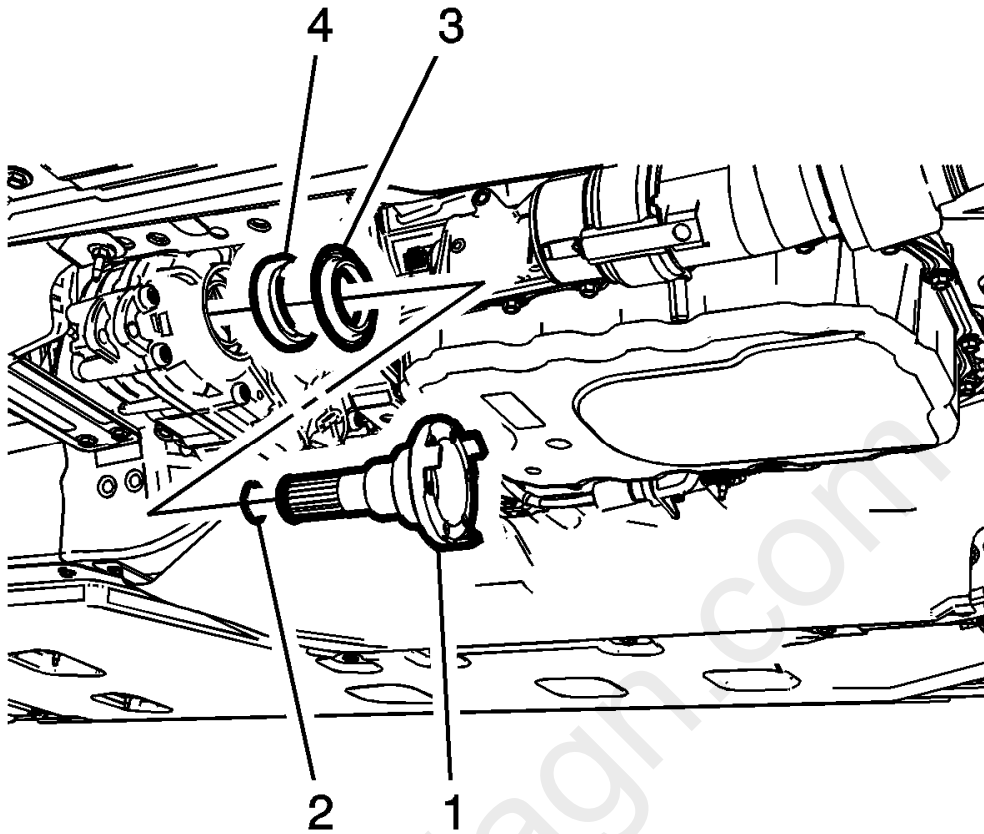


Fig. 22: Front Output Shaft

Courtesy of GENERAL MOTORS COMPANY

1. Install a NEW output shaft seal (4) using **J-47847** Output Seal Installer.
2. Install the front output shaft seal dirt deflector (3).
3. Install a NEW front output shaft retaining ring (2) to the output shaft (1).
4. Using a rubber type mallet to install the output shaft (1) and to seat the retaining ring into the ID groove of the front output gear.
5. Install the front propeller shaft. Refer to **Front Axle Propeller Shaft Replacement** .
6. Check the fluid level. Add fluid, if necessary. Refer to **Transfer Case Fluid Replacement**.
7. Lower the vehicle.

OIL DISTRIBUTION TUBE REPLACEMENT

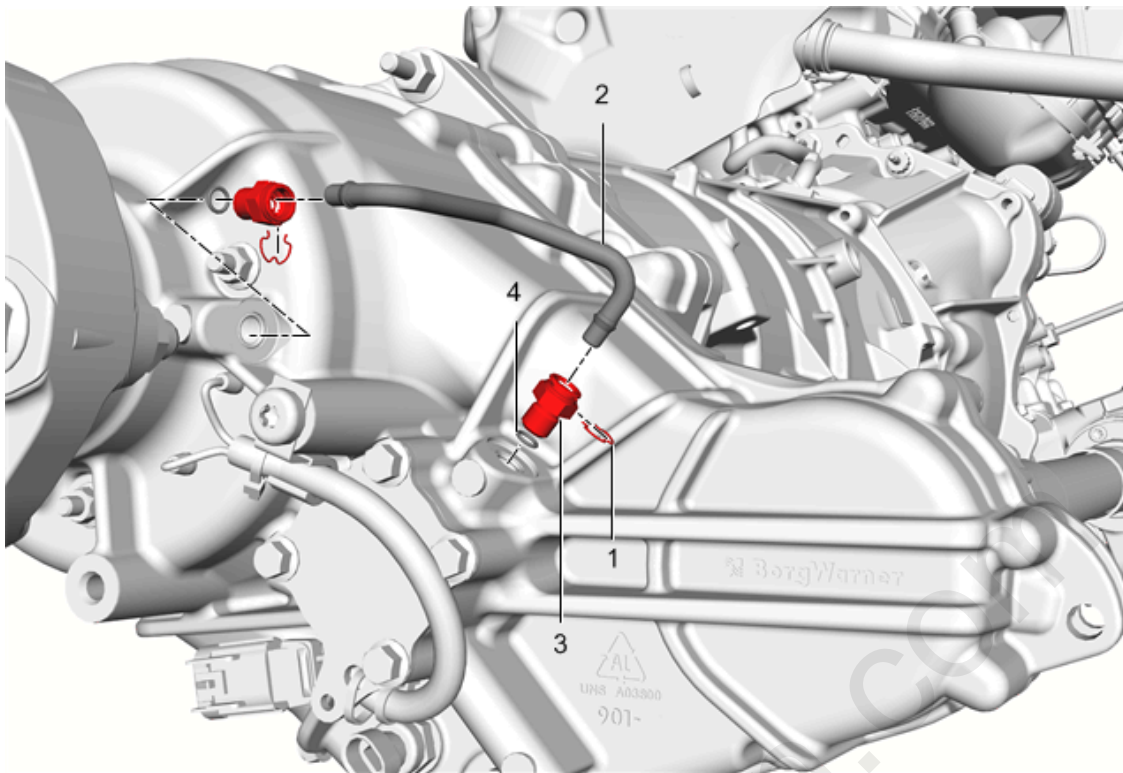


Fig. 23: Oil Distribution Tube
Courtesy of GENERAL MOTORS COMPANY

Oil Distribution Tube Replacement

Callout	Component Name
Preliminary Procedure	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
1	Oil Distribution Tube Retainer Clip (Qty 2)
2	NOTE: Refer to <u>New Product Information</u> for more information regarding design changes to the tube. Oil Distribution Tube
3	Oil Distribution Tube Fitting (Qty 2) CAUTION: Refer to <u>Component Fastener Tightening Caution</u> . Tighten 6 N.m (53 lb in)
4	Oil Distribution Tube O-ring (Qty 2)

TRANSFER CASE VIBRATION DAMPENER REPLACEMENT

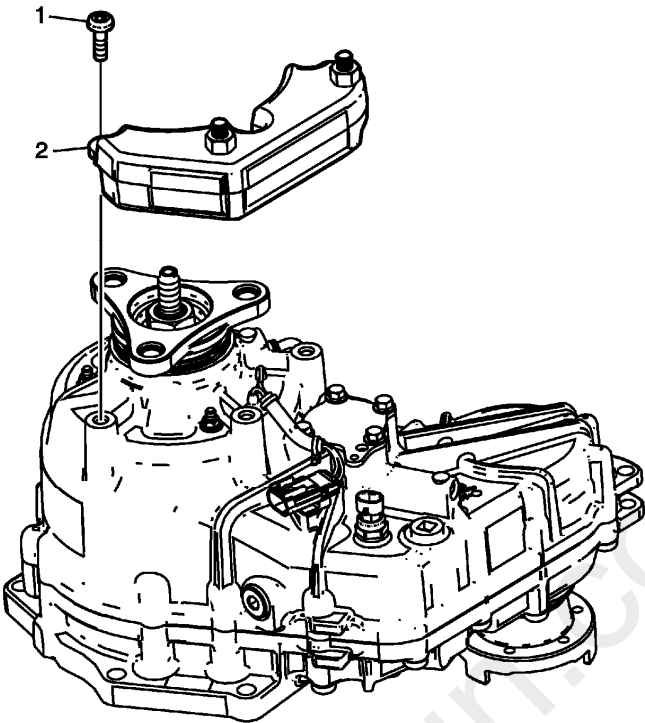


Fig. 24: Transfer Case Vibration Dampener
Courtesy of GENERAL MOTORS COMPANY

Transfer Case Vibration Dampener Replacement

Callout	Component Name
Preliminary Procedure	
1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .	
1	Transfer Case Vibration Dampener Bolts (Qty 2) CAUTION: Refer to Fastener Caution . Tighten 36 N.m (27 lb ft)
2	Transfer Case Vibration Dampener

REPAIR INSTRUCTIONS - OFF VEHICLE

TRANSFER CASE DISASSEMBLE

Vibration Dampener Removal

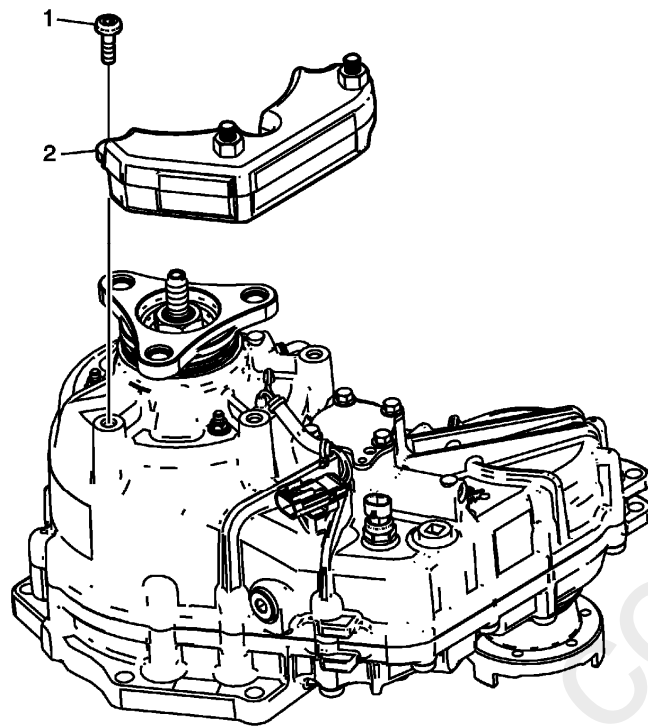


Fig. 25: Vibration Dampener
Courtesy of GENERAL MOTORS COMPANY

Vibration Dampener Removal

Callout	Component Name
1	Vibration Dampener Bolt - Model Dependent
2	Vibration Dampener - Model Dependent

Transfer Case Holding Fixture Installation

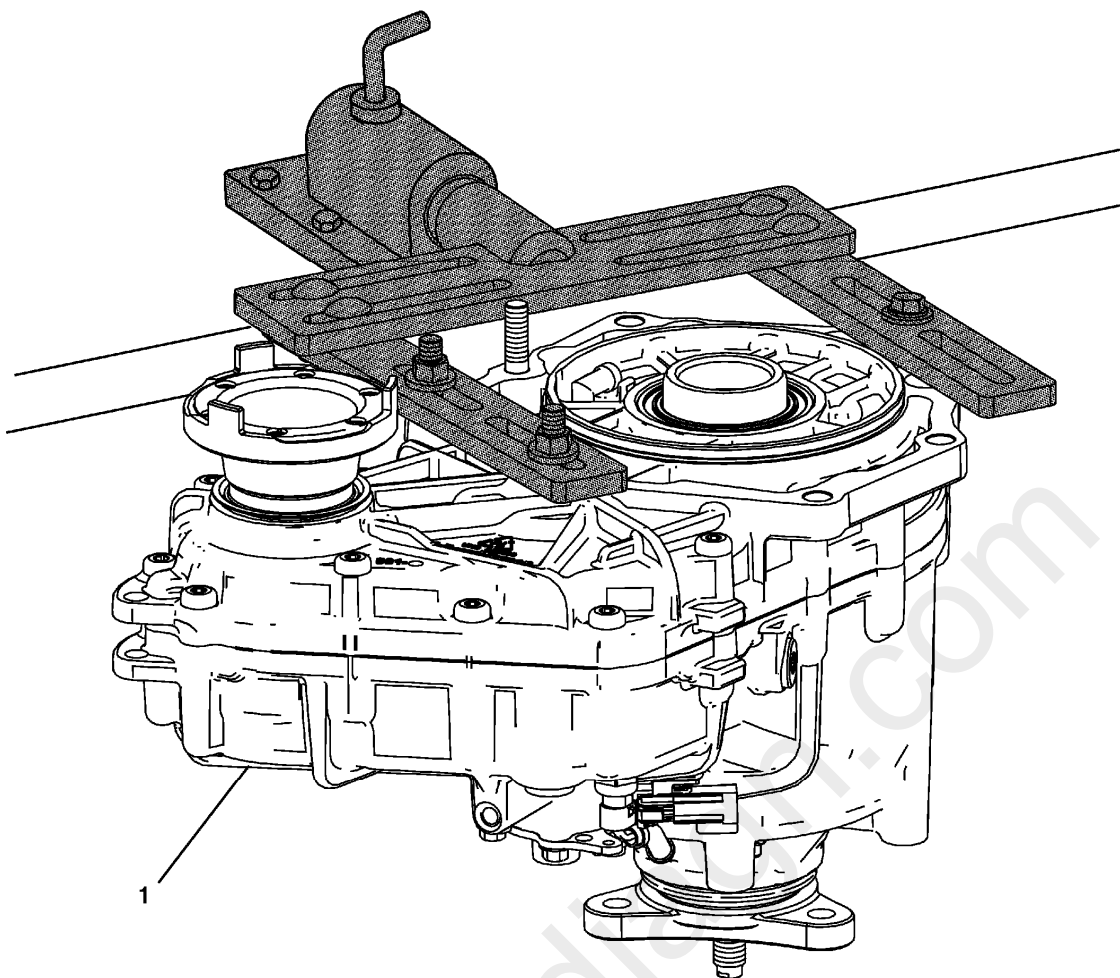


Fig. 26: Transfer Case Holding Fixture
 Courtesy of GENERAL MOTORS COMPANY

Transfer Case Holding Fixture Installation

Callout	Component Name
1	Transfer Case NOTE: 1. Always secure with the pivot pin after rotating. 2. The transfer case can be rotated 360 degrees to facilitate repair. 3. Use M10 x 1.5 mm nuts and bolts to retain the assembly to the fixture. Special Tools • DT-3289-20 Holding Fixture • J-36842 Transaxle Holding Fixture

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

Front Output Shaft and Seal Removal

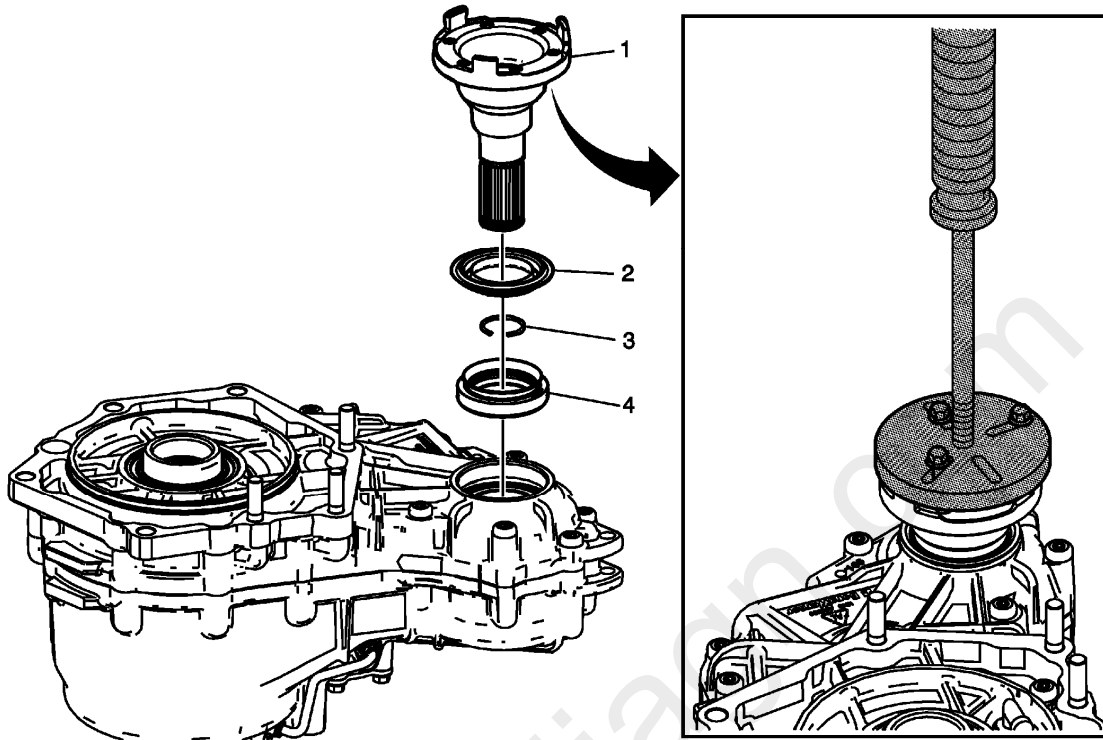


Fig. 27: Front Output Shaft and Seal
Courtesy of GENERAL MOTORS COMPANY

Front Output Shaft and Seal Removal

Callout	Component Name
1	Front Output Shaft NOTE: • The front output shaft is retained into the front output gear by an internal snap ring. • Use three M8 x 1.25 mm bolts to retain the adapter to the flange of the shaft. Special Tools • J-2619-A Slide Hammer w/ Adapter • J-45019 Flange and Pinion Cage Remover For equivalent regional tools, refer to Special Tools. Front Output Shaft Seal Dirt Deflector

2	NOTE: Remove the front output shaft seal dirt deflector as required.
3	Front Output Shaft Retaining Ring NOTE: Discard the front output shaft retaining ring.
4	Front Output Shaft Seal CAUTION: Refer to <u>Machined Surface Damage Caution</u> .

Oil Drain Plug, Oil Fill Plug, and Fluid Temperature Sensor Removal

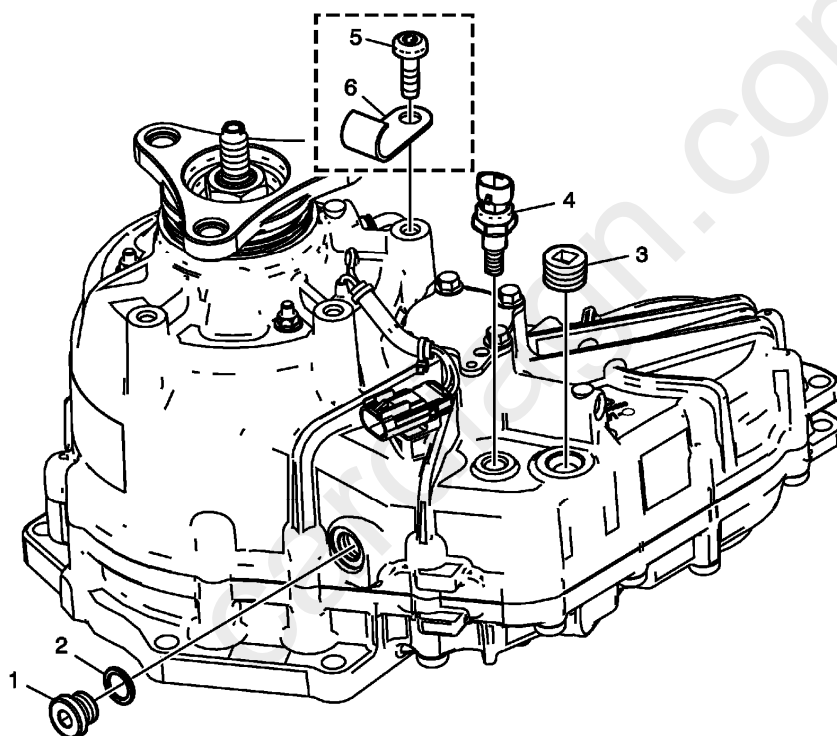


Fig. 28: Oil Drain Plug, Oil Fill Plug, and Fluid Temperature Sensor Removal
Courtesy of GENERAL MOTORS COMPANY

Oil Drain Plug, Oil Fill Plug, and Fluid Temperature Sensor Removal

Callout	Component Name
1	Oil Fill Plug
	Oil Fill Plug Seal
2	NOTE: Inspect the seal for wear or damage.

	• The seal is not a separate service part. If seal damage is present, replace the plug and seal as an assembly.
3	Oil Drain Plug
4	Fluid Temperature Sensor
5	Wiring Harness Clip Bolt - Model Dependent
6	Wiring Harness Clip - Model Dependent

Oil Delivery Tube and Oil Pump Removal

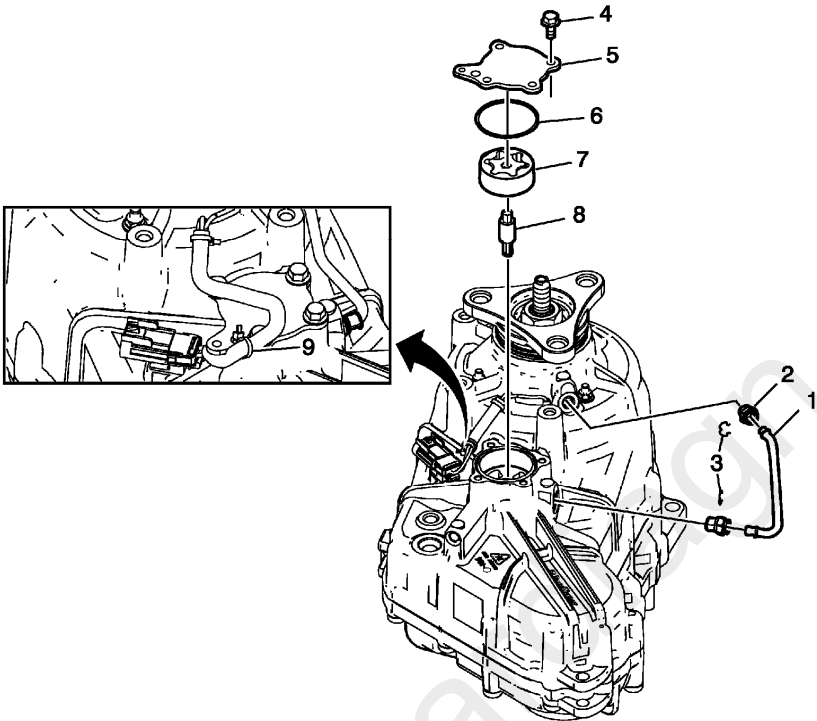


Fig. 29: Oil Delivery Tube and Oil Pump
Courtesy of GENERAL MOTORS COMPANY

Oil Delivery Tube and Oil Pump Removal

Callout	Component Name
1	Oil Delivery Tube Procedure Refer to <u>New Product Information</u> for more information regarding design changes to tube.
2	Oil Delivery Tube Fitting NOTE: Remove the transfer tube fittings as required.
3	Oil Delivery Tube Fitting Clip
4	Oil Pump Bolt
5	Oil Pump Cover

6	Oil Pump Seal
7	Oil Pump Assembly
8	Oil Pump Shaft
9	Strap

Rear Output Shaft Flange and Seal Removal

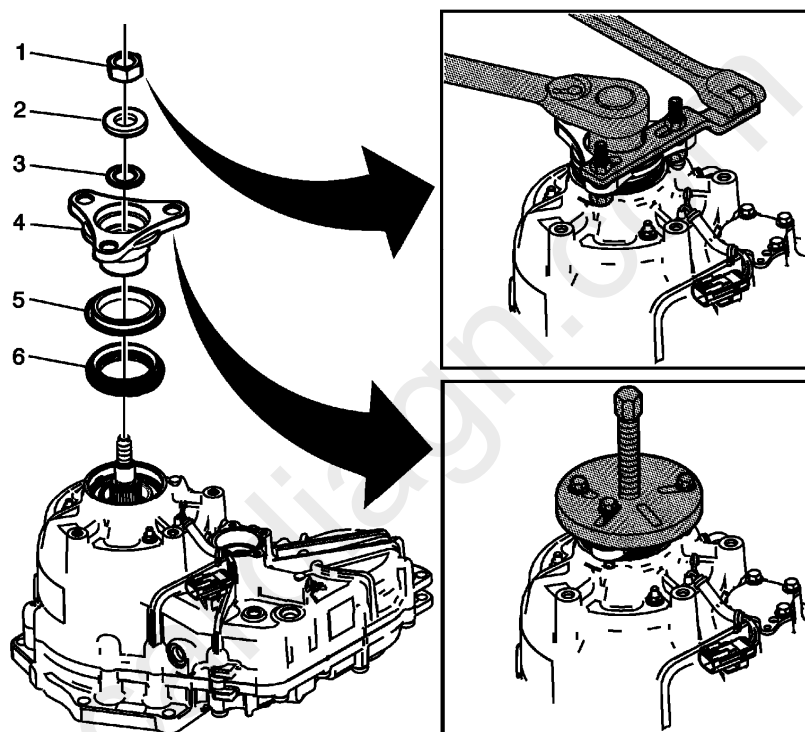


Fig. 30: Rear Output Shaft Flange and Seal
Courtesy of GENERAL MOTORS COMPANY

Rear Output Shaft Flange and Seal Removal

Callout	Component Name
1	Rear Output Shaft Flange Nut NOTE: Use M10 x 1.5 mm nuts and bolts to retain the tool to the flange. Special Tools J-45012 Holding Fixture For equivalent regional tools, refer to Special Tools.

2	Rear Output Shaft Flange Washer
3	Rear Output Shaft Flange O-ring Seal
4	Rear Output Shaft Flange NOTE: Use M10 x 1.5 mm nuts and bolts to retain the tool to the flange. Special Tools J-45019 Flange and Pinion Cage Remover
5	Rear Output Shaft Seal Dirt Deflector NOTE: Remove the rear output shaft seal dirt deflector as required.
6	Rear Output Shaft Seal CAUTION: Refer to <u>Machined Surface Damage Caution</u> .

Vent and Adapter Studs Removal

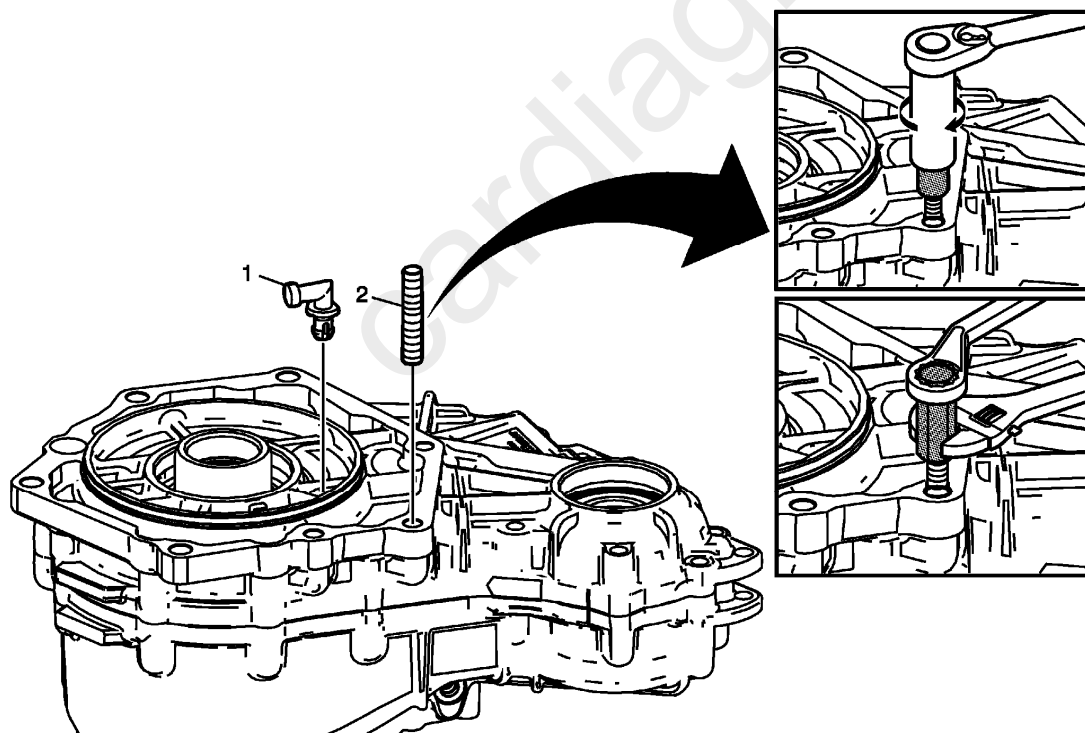


Fig. 31: Vent and Adapter Studs
Courtesy of GENERAL MOTORS COMPANY

Vent and Adapter Studs Removal

Callout	Component Name
1	Vent NOTE: - Remove the vent as required. - If vent removal is required, install a NEW vent during assembly.
2	Transfer Case Stud NOTE: Remove the transfer case-to-transmission studs as required. Special Tools DT-49308 Stud Remover and Installer For equivalent regional tools, refer to Special Tools .

Rear Case Half Removal

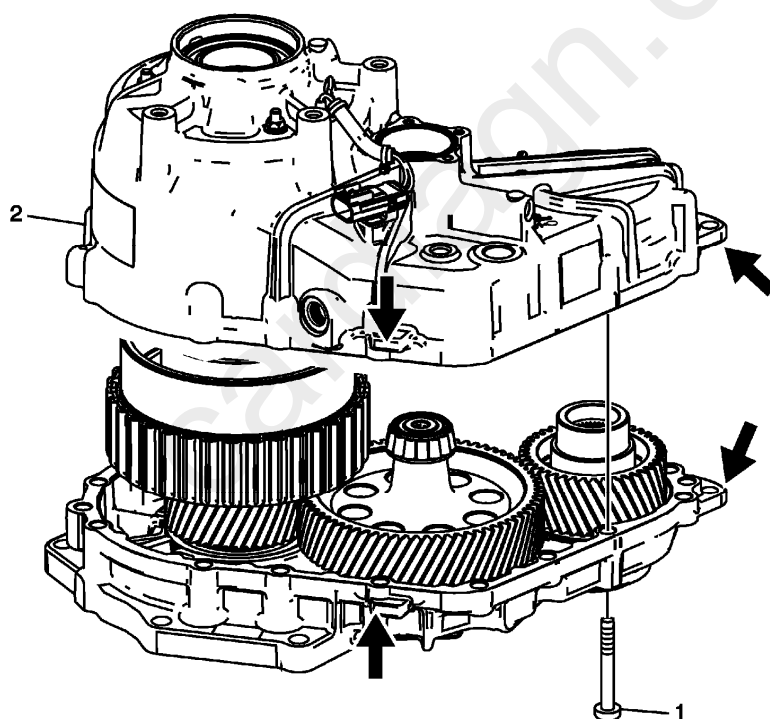


Fig. 32: Rear Case Half
 Courtesy of GENERAL MOTORS COMPANY

Rear Case Half Removal

Callout	Component Name
1	Case Half Bolt (Qty: 15)

2

Rear Case Half

NOTE:

Separate the case halves using a pry bar at the pry point locations.

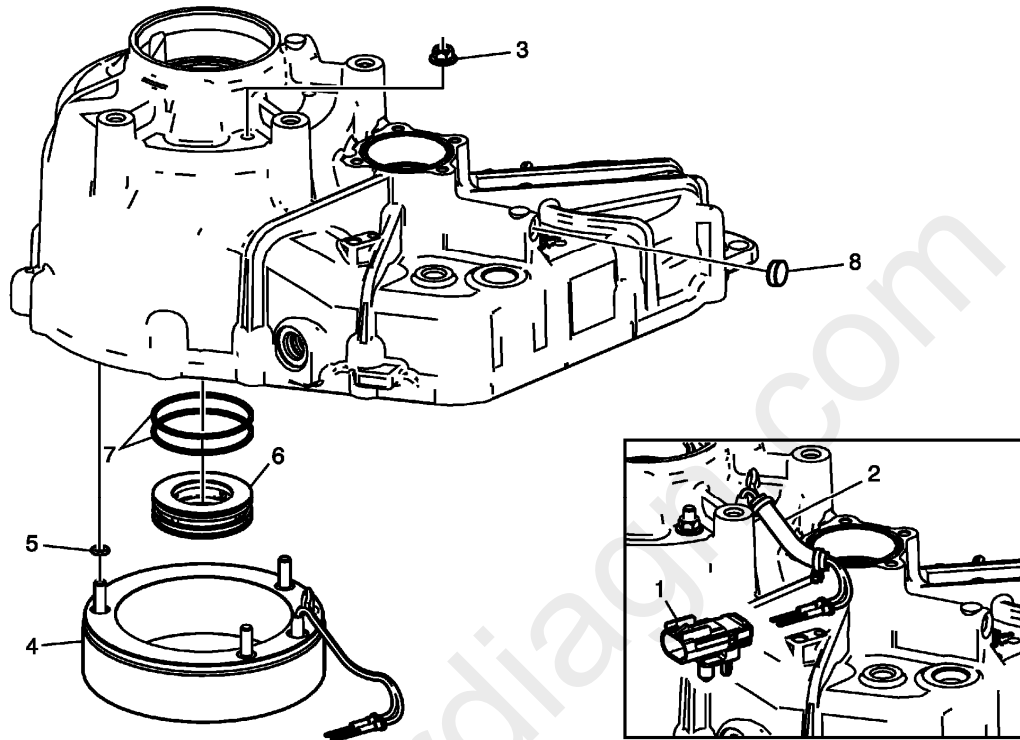
Two/Four Wheel Drive Clutch Coil Removal

Fig. 33: Two/Four Wheel Drive Clutch Coil
 Courtesy of GENERAL MOTORS COMPANY

Two/Four Wheel Drive Clutch Coil Removal

Callout	Component Name
1	Two/Four Wheel Drive Inline Wiring Connector NOTE: Remove the connector wire retaining clip and separate the wires from the connector.
2	Conduit NOTE: Slide the conduit over the clutch coil wires to remove it.
3	Coil Nut
4	Two/Four Wheel Drive Clutch Coil NOTE:

	Carefully slide the wires through the holes in the case to avoid damage to the wire coating.
5	Clutch Coil Stud O-ring Seals NOTE: The clutch coil stud O-ring seals are not serviceable separately. If seal damage is present, replace the clutch coil assembly.
6	Oil Distribution Hub
7	Oil Distribution Hub Seals NOTE: The oil distribution hub seals are not available as a separate service part. If seal damage is present, the hub and seals must be replaced as an assembly.
8	Pump Plug NOTE: Remove pump plug only if a leak is present and replacement is required.

Oil Baffle, Oil Pump Screen, and Case Half Locating Pin Removal

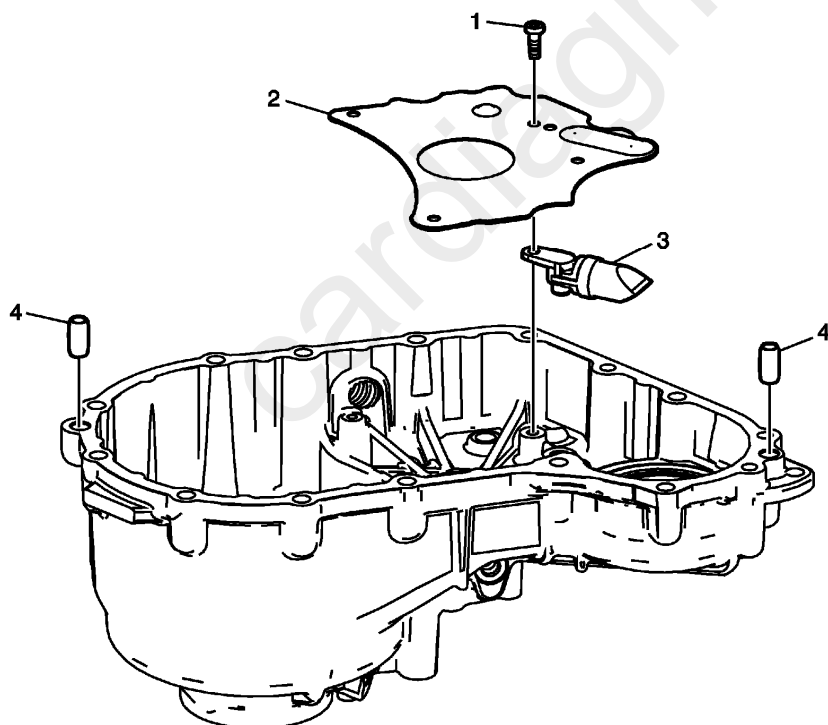


Fig. 34: Oil Baffle, Oil Pump Screen, and Case Half Locating Pin
Courtesy of GENERAL MOTORS COMPANY

Oil Baffle, Oil Pump Screen, and Case Half Locating Pin Removal

Callout	Component Name
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1	Oil Baffle Bolt (Qty: 4)
2	Oil Baffle
3	Oil Pump Screen
4	Case Half Locating Pin
	NOTE: Remove the pins only as required.

Idler Gear Rear Bearing Race and Front Output Shaft Rear Bearing Removal

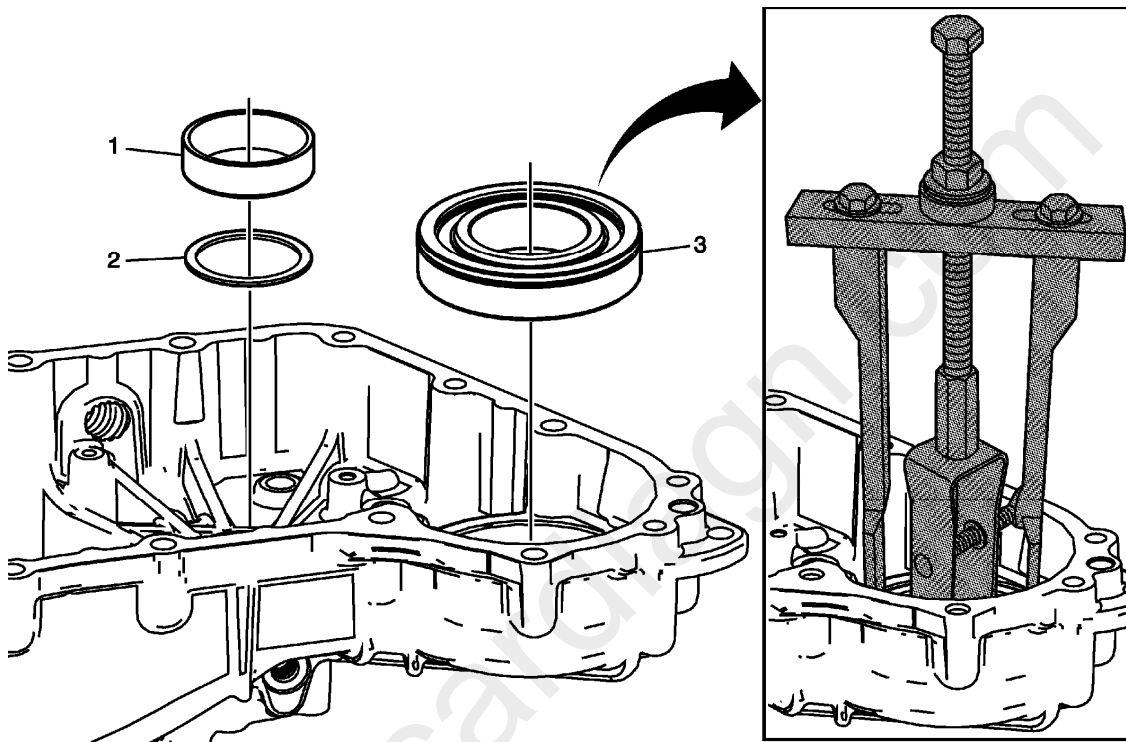


Fig. 35: Idler Gear Rear Bearing Race and Front Output Shaft Rear Bearing
Courtesy of GENERAL MOTORS COMPANY

Idler Gear Rear Bearing Race and Front Output Shaft Rear Bearing Removal

Callout	Component Name
1	Idler Gear Rear Bearing Race NOTE: DO NOT remove the idler gear bearing race and shim from the case half. The case halves, idler gear, and idler gear bearings and races are not available as separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.
	Idler Gear Bearing Shim NOTE:

2	DO NOT remove the idler gear bearing race and shim from the case half. The case halves, idler gear, and idler gear bearings and races are not available as separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.
3	Front Output Shaft Rear Bearing Special Tools • J-45124 Removal Bridge • J-45124-9 Puller Leg • J-29369-2 Bushing and Bearing Remover - 2-3 in For equivalent regional tools, refer to Special Tools.

Rear Output Shaft Rear Bearing Removal

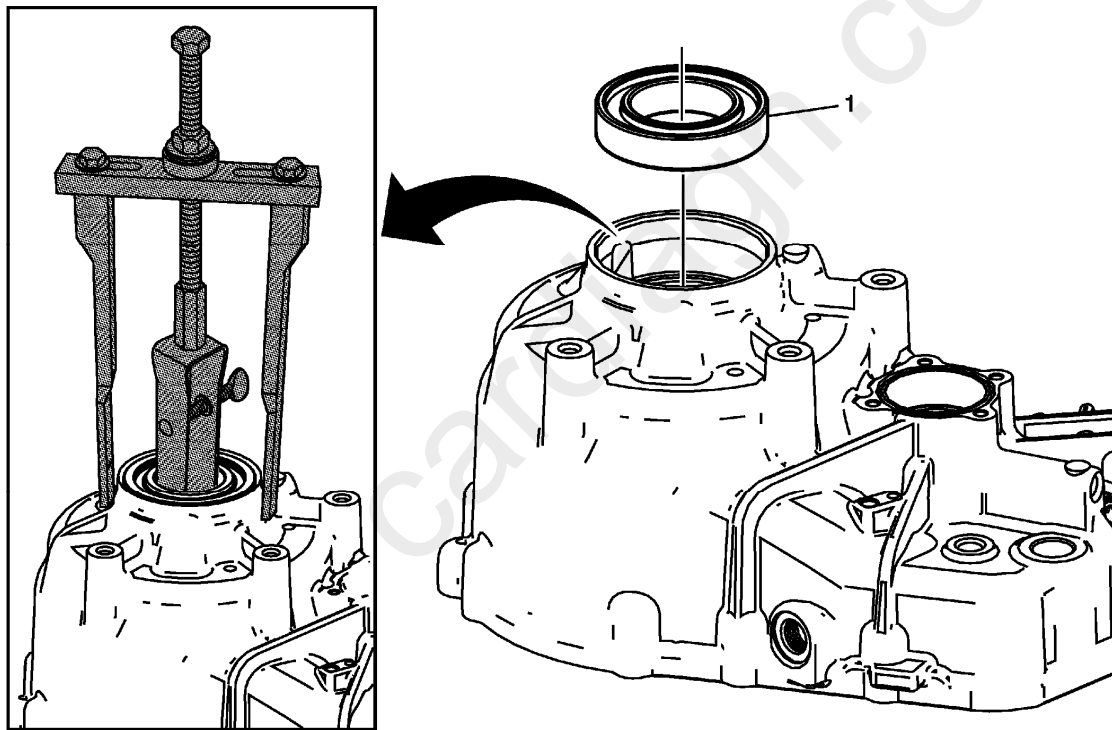


Fig. 36: Rear Output Shaft Rear Bearing
Courtesy of GENERAL MOTORS COMPANY

Rear Output Shaft Rear Bearing Removal

Callout	Component Name
	Rear Output Shaft Rear Bearing
	Special Tools

1

- J-45124 Removal Bridge
- J-45124-9 Puller Leg
- J-29369-2 Bushing and Bearing Remover - 2-3 in

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

Two/Four Wheel Drive Clutch Coil Housing Removal

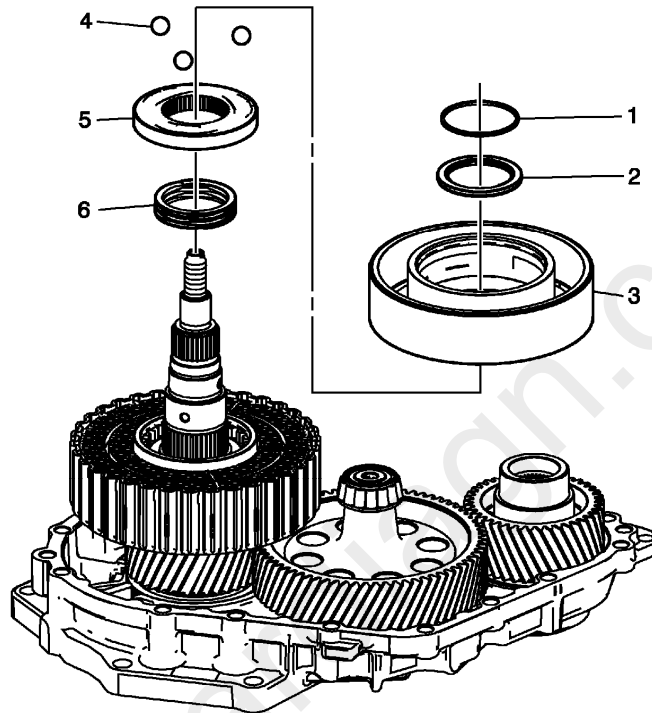


Fig. 37: Two/Four Wheel Drive Clutch Coil Housing
Courtesy of GENERAL MOTORS COMPANY

Two/Four Wheel Drive Clutch Coil Housing Removal

Callout	Component Name
1	Four Wheel Drive Clutch Shim
2	Four Wheel Drive Clutch Housing Bearing
3	Two/Four Wheel Drive Clutch Coil Housing
4	Apply Cam Ball (Qty: 3)
5	Apply Cam
6	Four Wheel Drive Clutch Spring

Armature and Front Drive Axle Clutch Assembly Removal

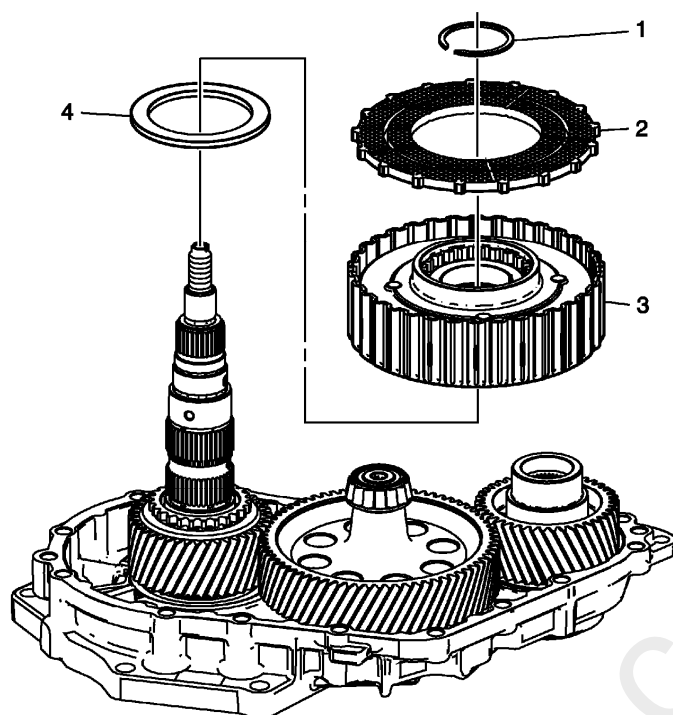


Fig. 38: Armature and Front Drive Axle Clutch Assembly
 Courtesy of GENERAL MOTORS COMPANY

Armature and Front Drive Axle Clutch Assembly Removal

Callout	Component Name
1	Two/Four Wheel Drive Clutch Retainer Ring
2	Armature
3	Front Drive Axle Clutch Assembly Procedure If the clutch pack assembly is replaced, reprogramming of the transfer case module is required. Refer to <u>Transfer Case Shift Control Module Programming and Setup (BW 4474)</u> , and <u>Transfer Case Information Label</u> .
4	Thrust Bearing

Input Gear and Thrust Bearing Removal

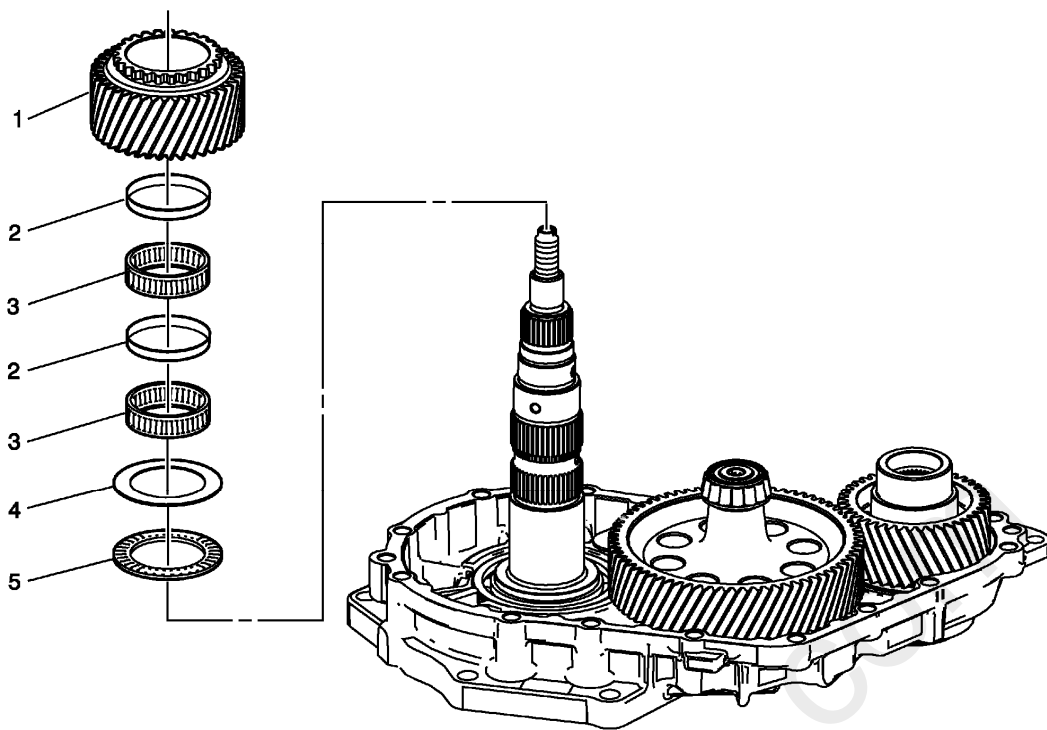


Fig. 39: Input Gear and Thrust Bearing
 Courtesy of GENERAL MOTORS COMPANY

Input Gear and Thrust Bearing Removal

Callout	Component Name
1	Input Gear
2	Input Shaft Spacer
3	Input Gear Bearing
4	Input Shaft Thrust Bearing Washer
5	Input Shaft Thrust Bearing

Idler Gear, Front Output Shaft Gear, and Oil Baffle Removal

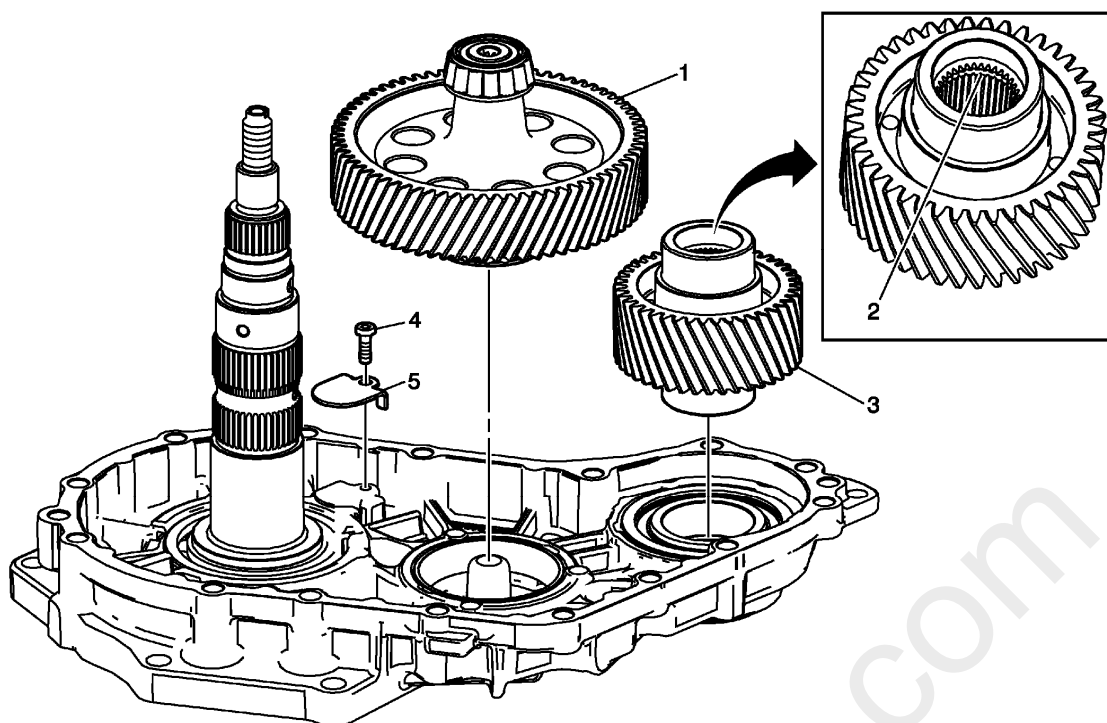


Fig. 40: Idler Gear, Front Output Shaft Gear, and Oil Baffle
 Courtesy of GENERAL MOTORS COMPANY

Idler Gear, Front Output Shaft Gear, and Oil Baffle Removal

Callout	Component Name
1	Idler Gear NOTE: The case halves, idler gear, and idler gear bearings and races are not available as separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.
2	Front Output Shaft Snap Ring Groove
3	Front Output Shaft Gear NOTE: The orientation and of the gear and the location of the front output shaft snap ring groove (2) for assembly. The gear is to be installed with the front output shaft snap ring groove (2) facing away from the front case half.
4	Oil Baffle Bolt
5	Oil Baffle

Input Shaft Removal

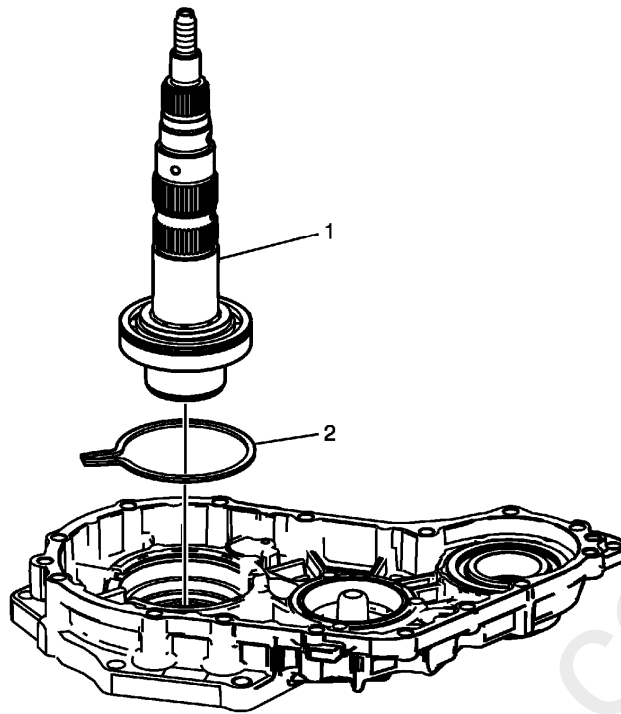


Fig. 41: Input Shaft

Courtesy of GENERAL MOTORS COMPANY

Input Shaft Removal

Callout	Component Name
1	Input Shaft NOTE: Spread the input shaft front bearing retainer ring to remove the input shaft.
2	Input Shaft Front Bearing Retainer Ring (Outer)

Input Bearing Removal

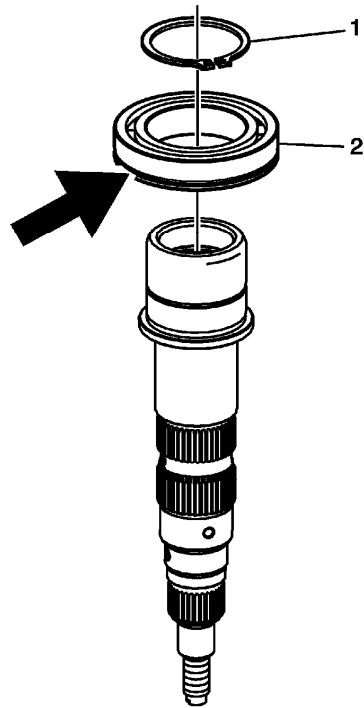


Fig. 42: Input Bearing

Courtesy of GENERAL MOTORS COMPANY

Input Bearing Removal

Callout	Component Name
1	Input Shaft Front Bearing Retainer Ring (Inner)
2	Input Bearing NOTE: Installation orientation of the front bearing onto the shaft for assembly. The retaining ring groove on the OD of the bearing is to be located facing the flange on the shaft.

Front Output Shaft Front Bearing and Idler Gear Front Bearing Race Removal

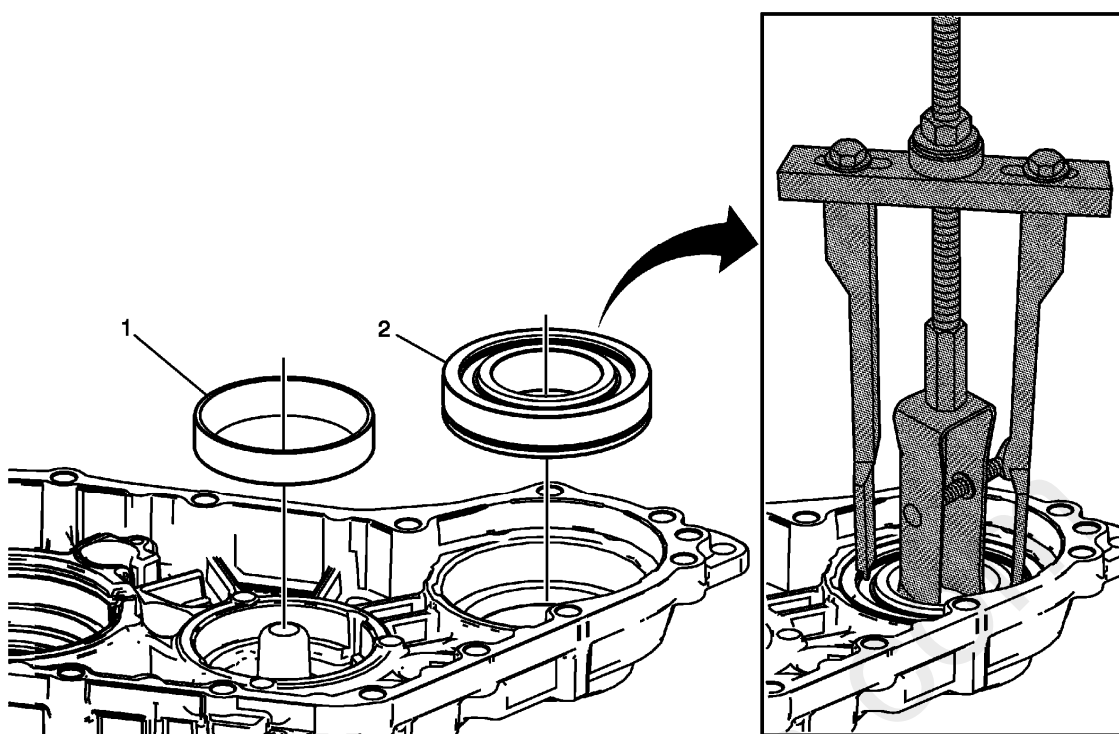


Fig. 43: Front Output Shaft Front Bearing and Idler Gear Front Bearing Race
 Courtesy of GENERAL MOTORS COMPANY

Front Output Shaft Front Bearing and Idler Gear Front Bearing Race Removal

Callout	Component Name
1	Idler Gear Front Bearing Race NOTE: DO NOT remove the idler gear bearing race from the case half. The case halves, idler gear, and idler gear bearings and races are not available as separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.
2	Front Output Shaft Front Bearing Special Tools • J-45124 Removal Bridge • J-45124-9 Puller Leg • J-29369-2 Bushing and Bearing Remover - 2-3 in For equivalent regional tools, refer to Special Tools .

Input Shaft Seal Removal

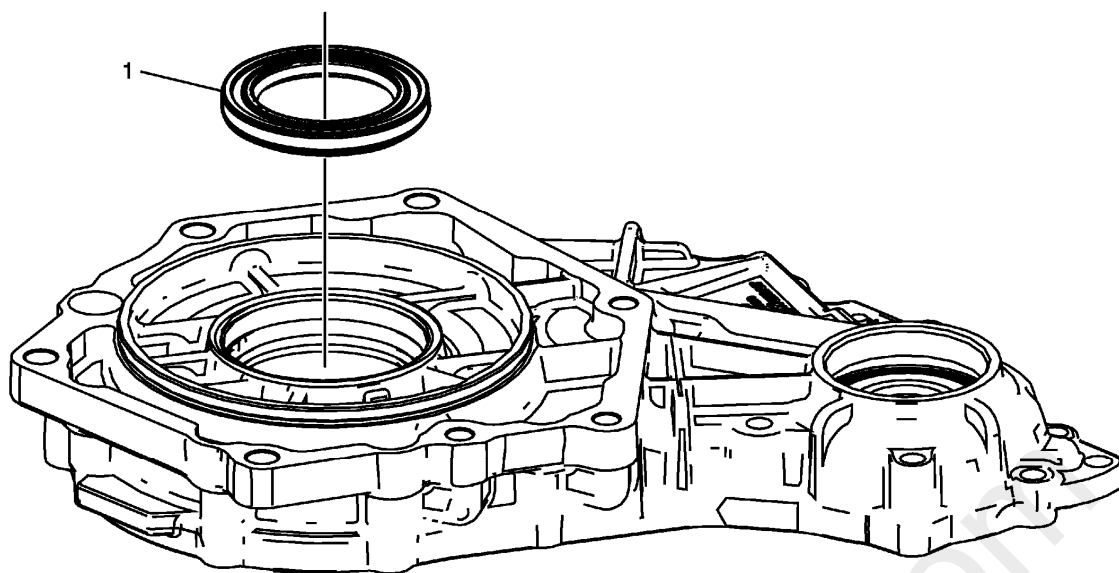


Fig. 44: Input Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

Input Shaft Seal Removal

Callout	Component Name
1	Input Shaft Seal CAUTION: Refer to <u>Machined Surface Damage Caution</u> .

TRANSFER CASE FRONT DRIVE AXLE VISCOUS CLUTCH DISASSEMBLE

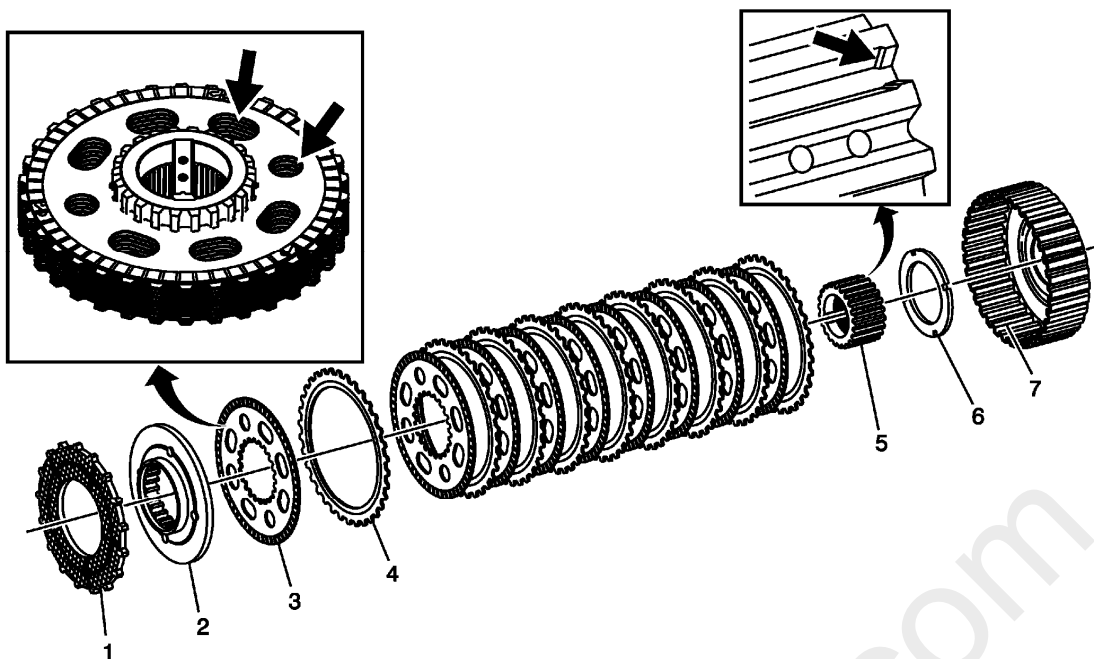


Fig. 45: Transfer Case Front Drive Axle Viscous Clutch
Courtesy of GENERAL MOTORS COMPANY

Transfer Case Front Drive Axle Viscous Clutch Disassemble

Callout	Component Name
NOTE: If the clutch pack assembly is replaced, the TCCM must be recalibrated using the service calibration. Refer to <u>Transfer Case Information Label</u> .	
1	Armature
2	Pressure Plate
3	Friction Plate
4	Separator Plate
5	Clutch Hub
6	Thrust Washer
7	Clutch Drum

TRANSFER CASE CLEANING AND INSPECTION

Front and Rear Case Halves Cleaning and Inspection

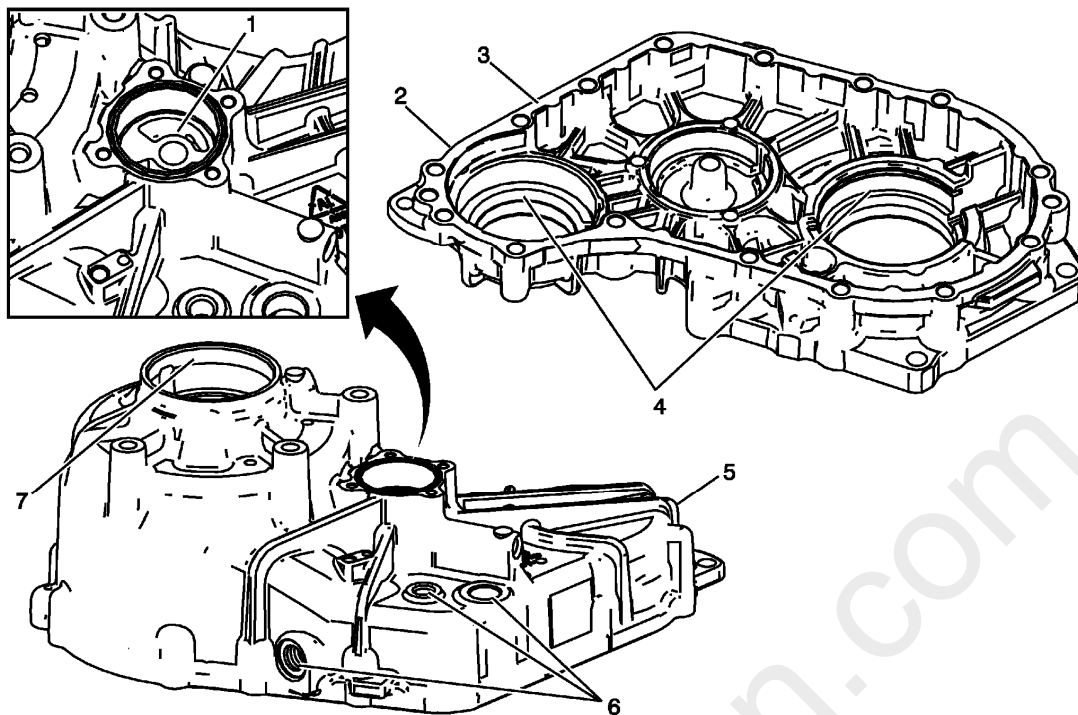


Fig. 46: Front and Rear Case Halves
Courtesy of GENERAL MOTORS COMPANY

Front and Rear Case Halves Cleaning and Inspection

Callout	Component Name
CAUTION: Refer to <u>Machined Surface Damage Caution</u> .	
Preliminary Procedures 1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. 2. Remove the sealer from the case sealing surfaces. 3. Clean the case and cover in cleaning solvent and air dry. 4. Inspect for cracks, broken areas, or other damage. Repair small scratches on the sealing surfaces with light sanding.	
1	Scored or damaged oil pump housing
2	Front Case Half
	NOTE: The case halves, idler gear, and idler gear bearings and races are not available as separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.

3	Seal surfaces
4	Front Case Bearing Race Bores
5	Rear Case Half NOTE: The case halves, idler gear, and idler gear bearings and races are not available as separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.
6	Damage to threaded bolt holes
7	Rear Case Bearing Race Bores

Input Shaft and Front Output Shaft Cleaning and Inspection

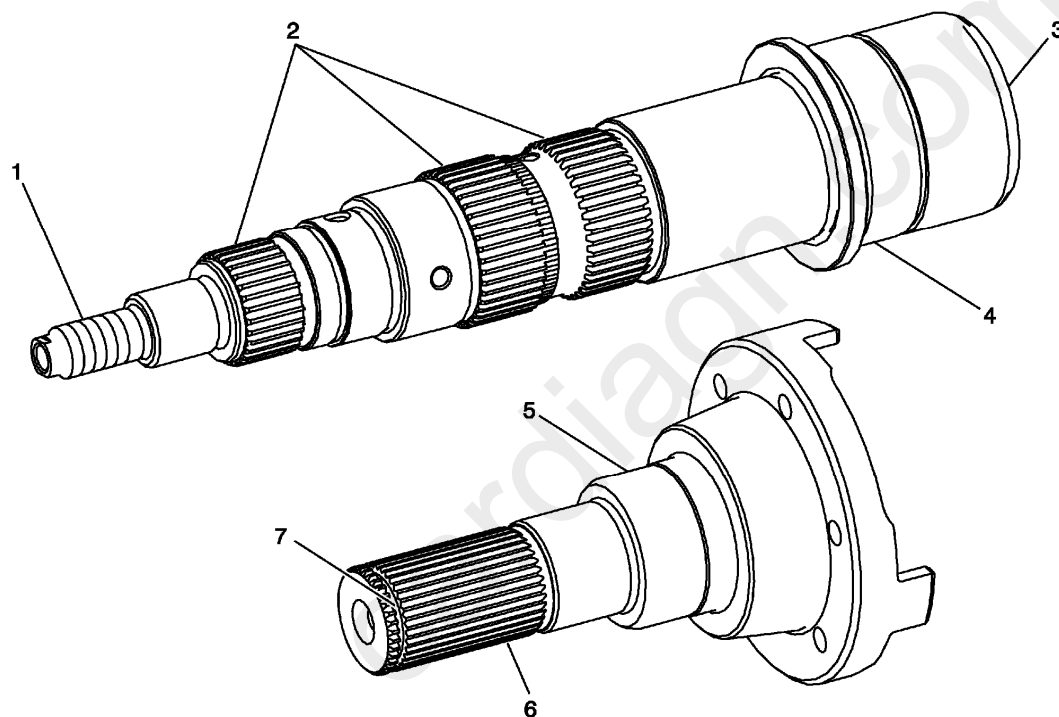


Fig. 47: Input Shaft and Front Output Shaft
Courtesy of GENERAL MOTORS COMPANY

Input Shaft and Front Output Shaft Cleaning and Inspection

Callout	Component Name
Preliminary Procedures	
1.	Clean the shafts in solvent and air dry, including the input shaft oil galleries.
2.	Inspect all components or sub-components and perform any repair procedure necessary to fix the damage.
1	Inspect internal and external threads for damage.
2	Inspect the splines for damage or excessive wear. Witness marks are normal.

3	Input Shaft Assembly NOTE: Inspect the seal surfaces for scoring, rust or other damage.
4	Inspect the bearing journals for scoring, pitting, or excessive wear. NOTE: Do not attempt to smooth roughness in the bearing journals.
5	Front Output Shaft Sealing Surface NOTE: Inspect the seal surfaces for scoring, rust or other damage.
6	Inspect the splines for damage or excessive wear. Witness marks are normal.
7	Front output flange snap ring groove for damage.

Clutch Coil Assembly Cleaning and Inspection

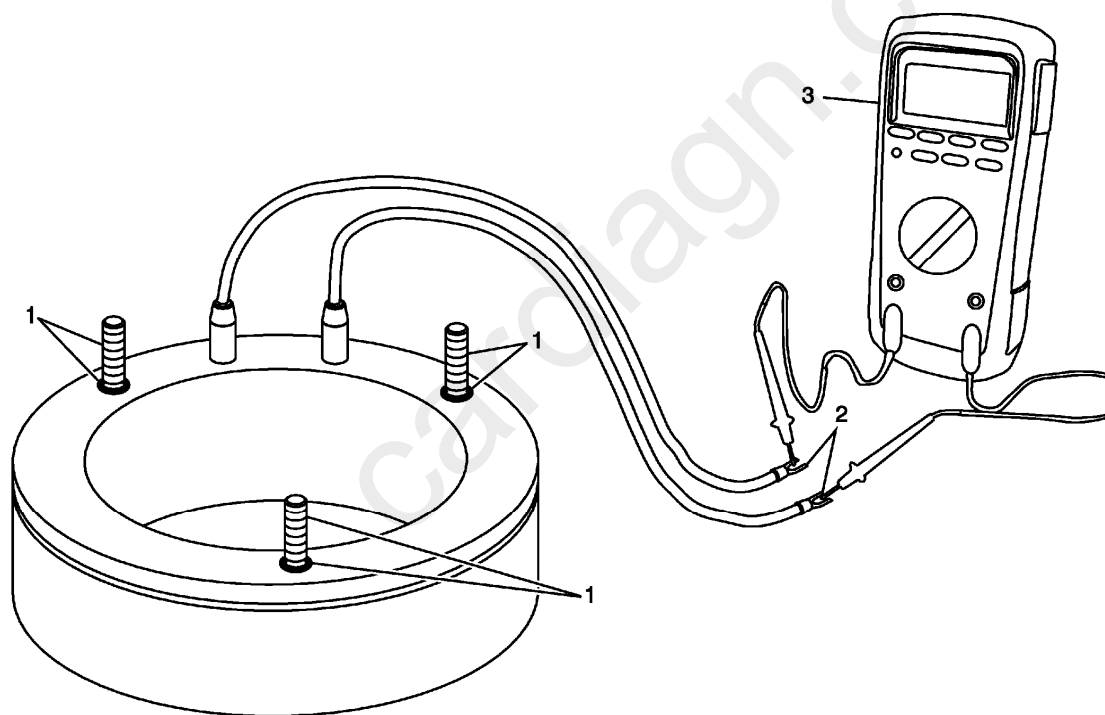


Fig. 48: Clutch Coil Assembly
Courtesy of GENERAL MOTORS COMPANY

Clutch Coil Assembly Cleaning and Inspection

Callout	Component Name
Preliminary Procedures	

1. Clean all components in solvent and air dry. 2. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage.	
1	Clutch Coil Assembly Studs NOTE: • Inspect the stud threads and coil O-rings for damage. • The clutch coil wire and stud O-ring seals are not serviceable separately. If O-ring seal damage is present, replace the clutch coil and seals as an assembly.
2	Clutch Coil Assembly Wires NOTE: Inspect the wires and terminals for damage. Repair, as required.
3	Clutch Coil Resistance Check NOTE: The clutch coil resistance should not exceed 2.5-3.5 ohms at 20°C (68°F).

Clutch Components Cleaning and Inspection

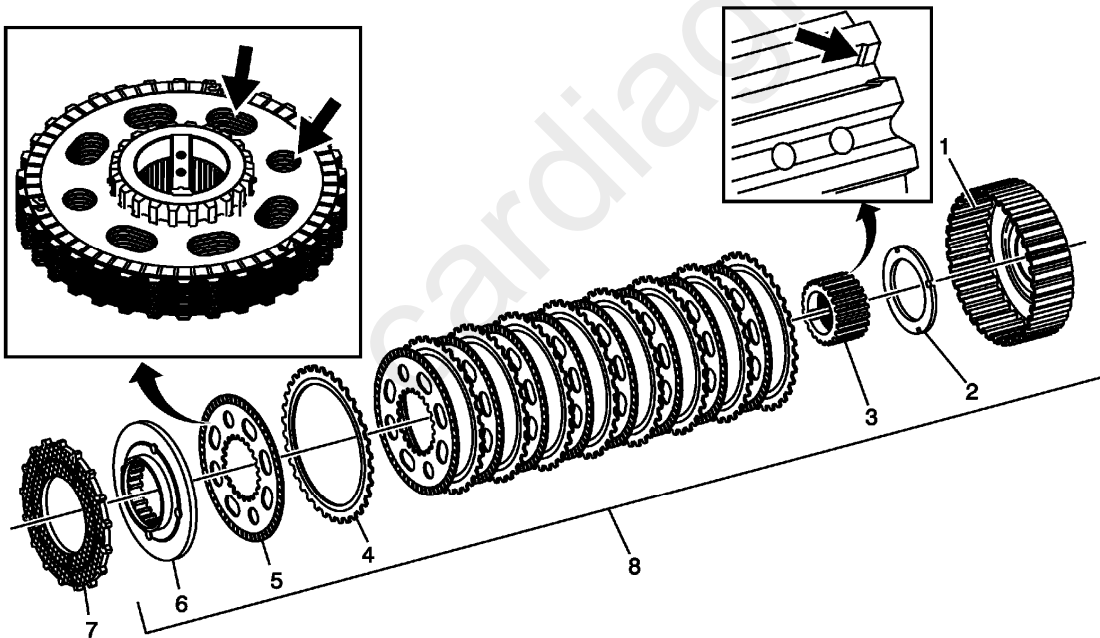


Fig. 49: Clutch Components
Courtesy of GENERAL MOTORS COMPANY

Clutch Components Cleaning and Inspection

Callout	Component Name
Preliminary Procedures	
1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. The clutch pack is only available for service as an assembly. If the clutch pack assembly is replaced, reprogramming of the transfer case module is required. Refer to <u>Transfer Case Shift Control Module Programming and Setup (BW 4474)</u> , and <u>Transfer Case Information Label</u>. 2. Do not clean the clutch friction plates in solvent. 3. Other components may be cleaned in solvent.	
1	Transfer Case Clutch Drum NOTE: Inspect the clutch drum for excessive wear or damage. Excessive wear can be identified by steps in the teeth, which prevent the plates from moving freely.
2	Transfer Case Thrust Washer for excessive wear or damage.
3	Transfer Case Clutch Hub NOTE: Inspect the clutch hub for excessive wear or damage. Excessive wear can be identified by steps in the teeth, which prevent the plates from moving freely.
4	Transfer Case Separator Plate NOTE: • Inspect the plates for wear or scoring. • Inspect the plates for flatness and warping.
5	Transfer Case Friction Plate NOTE: • The friction plates are assembled with the lube holes aligned as indicated in order to provide an unrestricted oil path when assembled. • Inspect the plates for worn, scored, or burnt friction material. • Inspect the plates for flatness and warping.
6	Transfer Case Pressure Plate NOTE: Inspect the plates for flatness, warping, or scoring to the friction plate contact surface.
7	Transfer Case Armature NOTE: Small scratches or wear are allowed. Deep gouges or raised metal on the armature require transfer case replacement and transfer case module reprogramming.
	Transfer Case Clutch Pack Assembly

8

NOTE:

If the clutch pack assembly is replaced, reprogramming of the transfer case module is required. Refer to Transfer Case Shift Control Module Programming and Setup (BW 4474).

TRANSFER CASE FRONT DRIVE AXLE VISCOUS CLUTCH ASSEMBLY

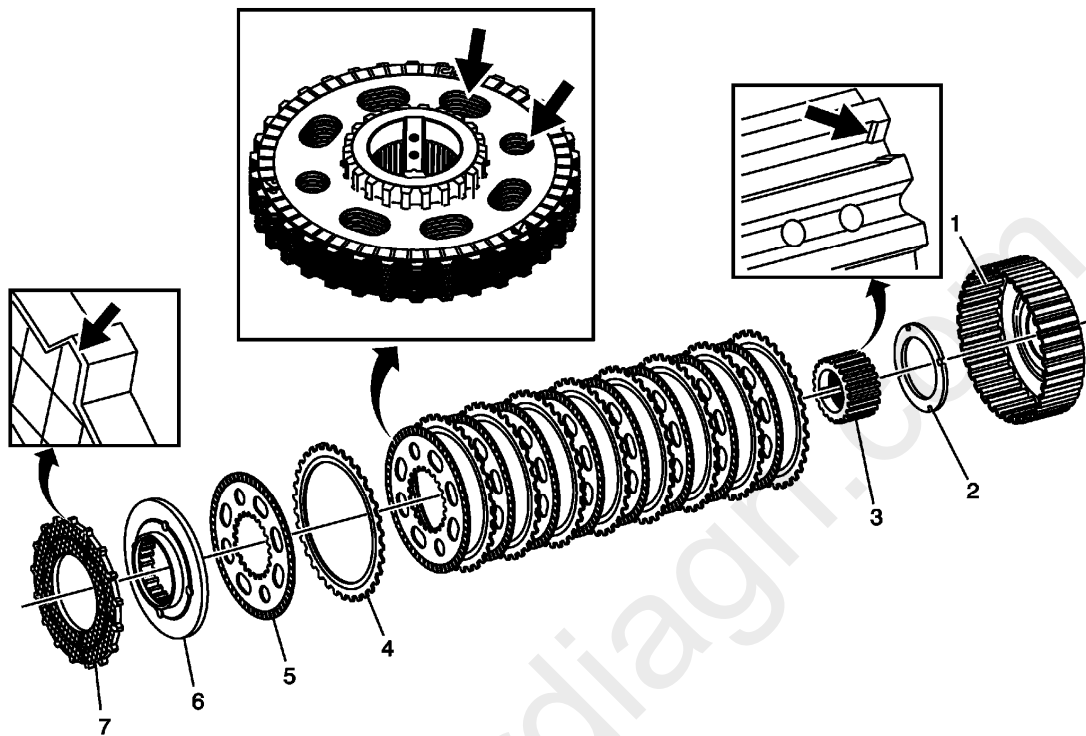


Fig. 50: Transfer Case Front Drive Axle Viscous Clutch
Courtesy of GENERAL MOTORS COMPANY

Transfer Case Front Drive Axle Viscous Clutch Assemble

Callout	Component Name
NOTE: If the clutch pack assembly is replaced, the TCCM must be recalibrated using the service calibration. Refer to <u>Transfer Case Information Label</u> .	
1	Clutch Drum
2	Thrust Washer
3	Clutch Hub NOTE: Note the orientation of the clutch hub for assembly.
4	Separator Plate
	Friction Plate

5	NOTE: • Note the orientation of the friction plates for assembly. • The friction plates are assembled with the lube holes aligned as indicated in order to provide an unrestricted oil path when assembled.
6	Pressure Plate
7	Armature NOTE: The armature is to be installed with the tapered edge outward and facing the rotor.

TRANSFER CASE ASSEMBLE

Front Output Shaft Front Bearing and Idler Gear Front Bearing Race Installation

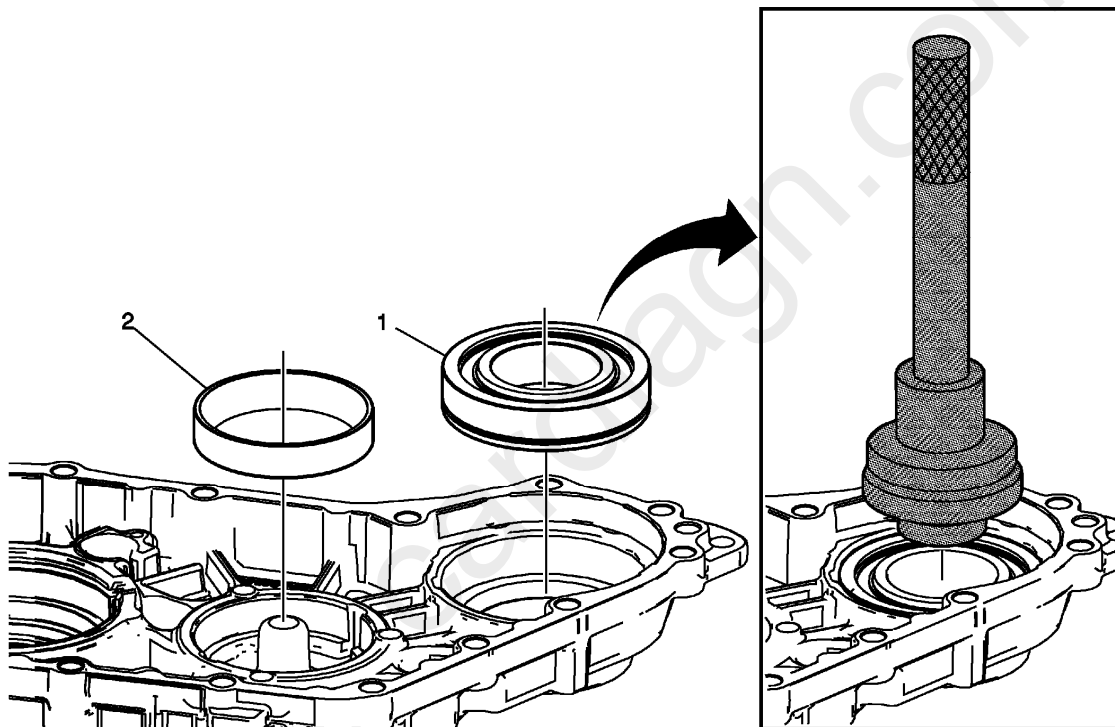


Fig. 51: Front Output Shaft Front Bearing and Idler Gear Front Bearing Race
 Courtesy of GENERAL MOTORS COMPANY

Front Output Shaft Front Bearing and Idler Gear Front Bearing Race Installation

Callout	Component Name
1	Front Output Shaft Front Bearing Special Tools • DT-8092 Driver Handle

	• J-38412 Bearing Cup Installer For equivalent regional tools, refer to Special Tools.
2	Idler Gear Front Bearing Race NOTE: DO NOT remove the idler gear bearing race from the case half. The case halves, idler gear, and idler gear bearings and races are not available as separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.

Input Shaft Seal Installation

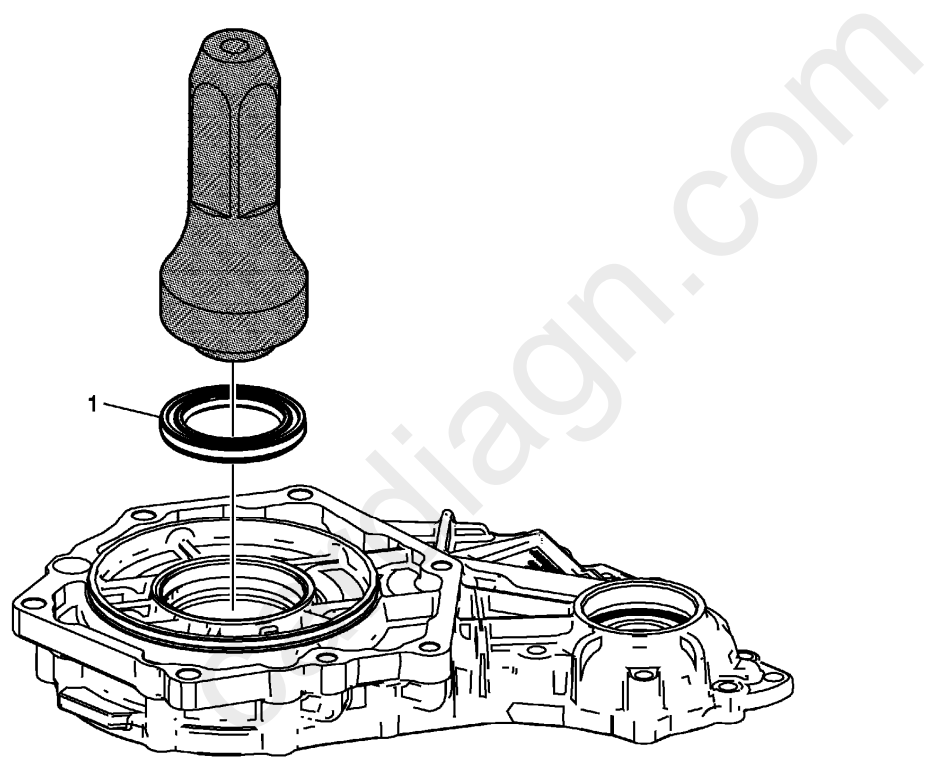


Fig. 52: Input Shaft Seal
 Courtesy of GENERAL MOTORS COMPANY

Input Shaft Seal Installation

Callout	Component Name
1	Input Shaft Seal Special Tools J-42738 Seal Installer For equivalent regional tools, refer to Special Tools.

Input Bearing Installation

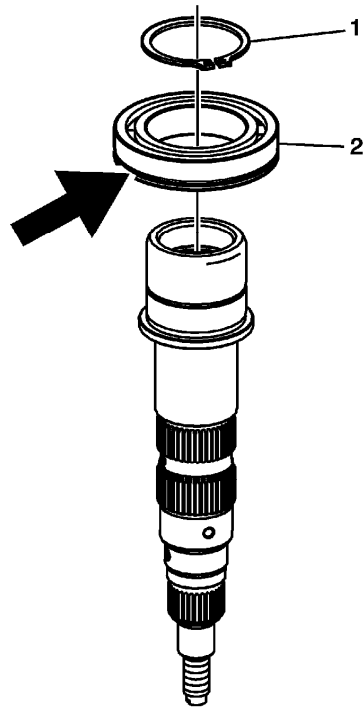


Fig. 53: Input Bearing
 Courtesy of GENERAL MOTORS COMPANY

Input Bearing Installation

Callout	Component Name
1	Input Shaft Front Bearing Retainer Ring (Inner)
2	Input Bearing NOTE: Install the front bearing onto the shaft with the retaining ring groove facing the shaft flange.

Input Shaft Installation

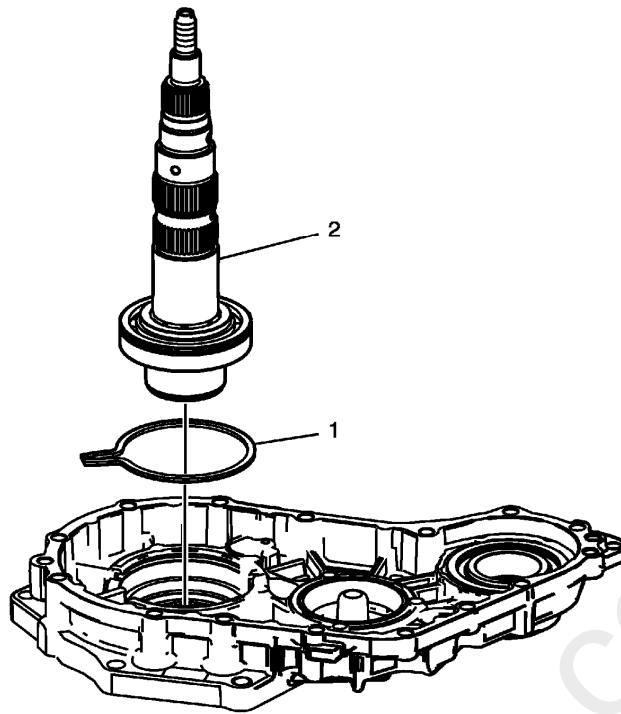


Fig. 54: Input Shaft

Courtesy of GENERAL MOTORS COMPANY

Input Shaft Installation

Callout	Component Name
1	Input Shaft Front Bearing Retainer Ring (Outer) NOTE: Spread the input shaft front bearing retainer ring (1) to install the input shaft.
2	Input Shaft

Idler Gear, Front Output Shaft Gear, and Oil Baffle Installation

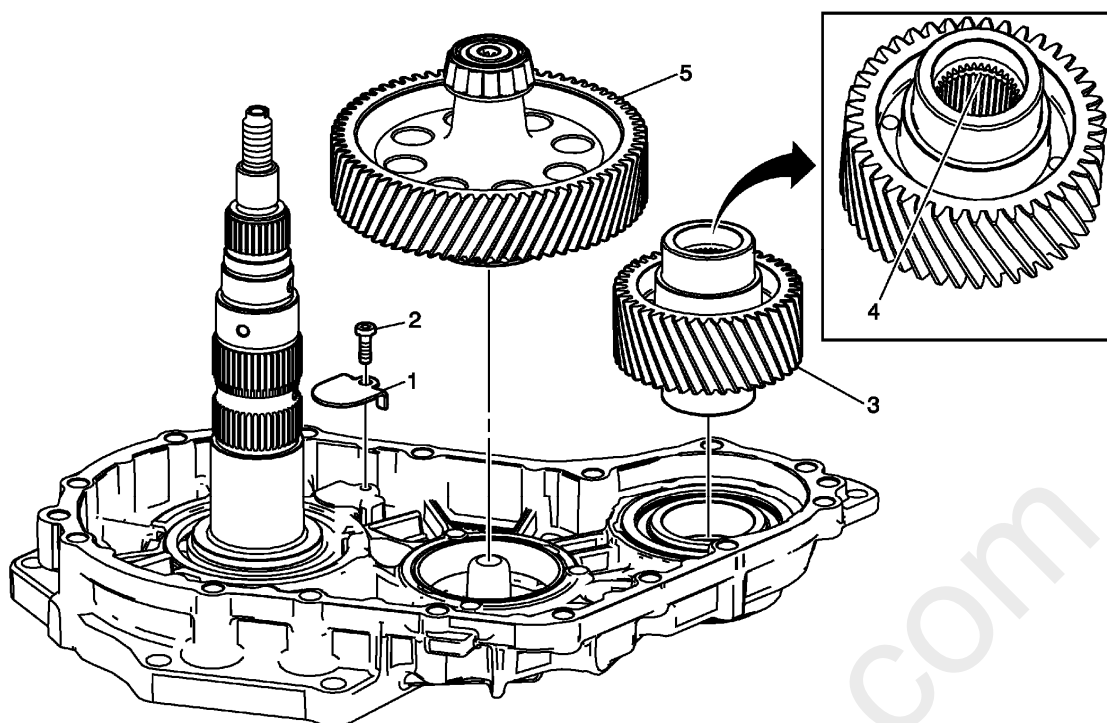


Fig. 55: Idler Gear, Front Output Shaft Gear, and Oil Baffle
 Courtesy of GENERAL MOTORS COMPANY

Idler Gear, Front Output Shaft Gear, and Oil Baffle Installation

Callout	Component Name
1	Oil Baffle
2	Oil Baffle Bolt CAUTION: Refer to <u>Fastener Caution</u> . Tighten 8 (70 lb in)
3	Front Output Shaft Gear NOTE: The orientation of the gear and the location of the front output shaft snap ring groove (4) for assembly. The gear is to be installed with the front output shaft snap ring groove (4) groove facing away from the front case half.
4	Front Output Shaft Snap Ring Internal Groove
5	Idler Gear NOTE: The case halves, idler gear, and idler gear bearings and races are not available as

separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.

Input Gear and Input Shaft Thrust Bearing Installation

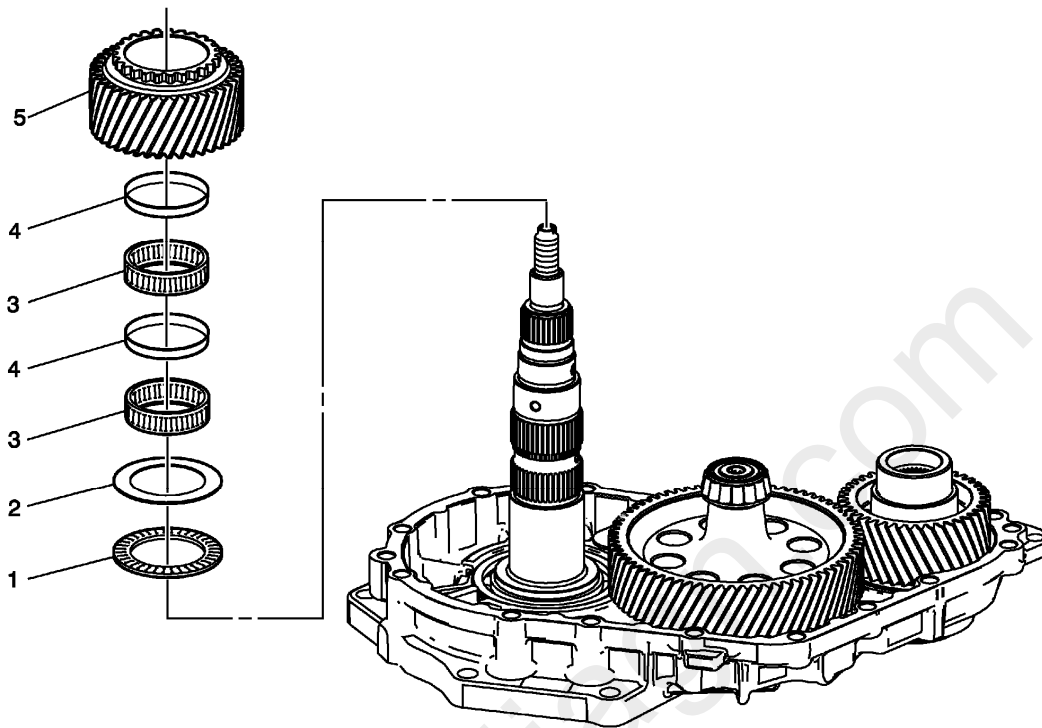


Fig. 56: Input Gear and Input Shaft Thrust Bearing
Courtesy of GENERAL MOTORS COMPANY

Input Gear and Input Shaft Thrust Bearing Installation

Callout	Component Name
1	Input Shaft Thrust Bearing
2	Input Shaft Thrust Bearing Washer
3	Input Gear Bearing
4	Input Shaft Spacer
5	Input Gear

Armature and Front Drive Axle Clutch Assembly Installation

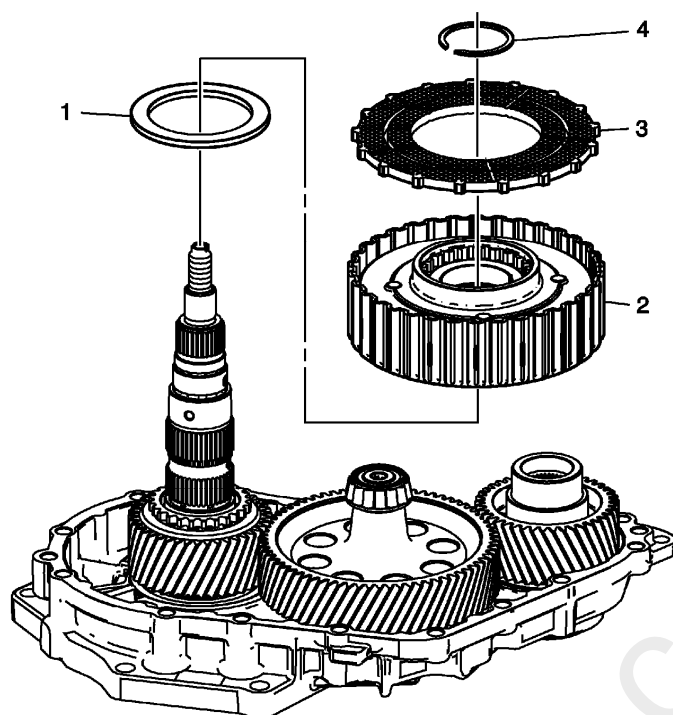


Fig. 57: Armature and Front Drive Axle Clutch Assembly
 Courtesy of GENERAL MOTORS COMPANY

Armature and Front Drive Axle Clutch Assembly Installation

Callout	Component Name
1	Thrust Bearing
2	Front Drive Axle Clutch Assembly Procedure If the clutch pack assembly is replaced, reprogramming of the transfer case module is required. Refer to <u>Transfer Case Shift Control Module Programming and Setup (BW 4474)</u> , and <u>Transfer Case Information Label</u> . Refer to <u>Transfer Case Front Drive Axle Viscous Clutch Assemble</u> .
3	Armature
4	Two/Four Wheel Drive Clutch Retainer Ring

Oil Distribution Hub and Two/Four Wheel Drive Clutch Coil Housing Installation

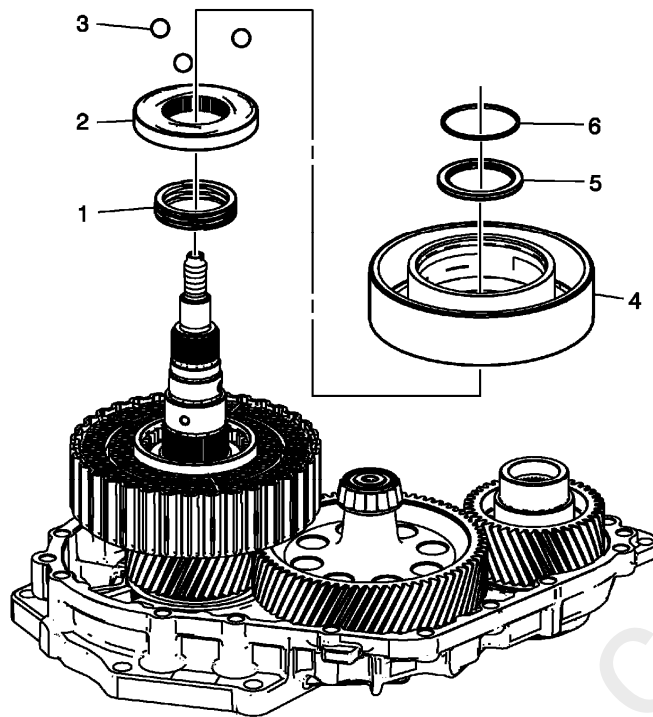


Fig. 58: Oil Distribution Hub and Two/Four Wheel Drive Clutch Coil Housing
 Courtesy of GENERAL MOTORS COMPANY

Oil Distribution Hub and Two/Four Wheel Drive Clutch Coil Housing Installation

Callout	Component Name
1	Four Wheel Drive Clutch Spring
2	Apply Cam
3	Apply Cam Ball (Qty: 3)
4	Two/Four Wheel Drive Clutch Coil Housing
5	Four Wheel Drive Clutch Housing Bearing
6	Four Wheel Drive Clutch Shim

Rear Output Shaft Rear Bearing Installation

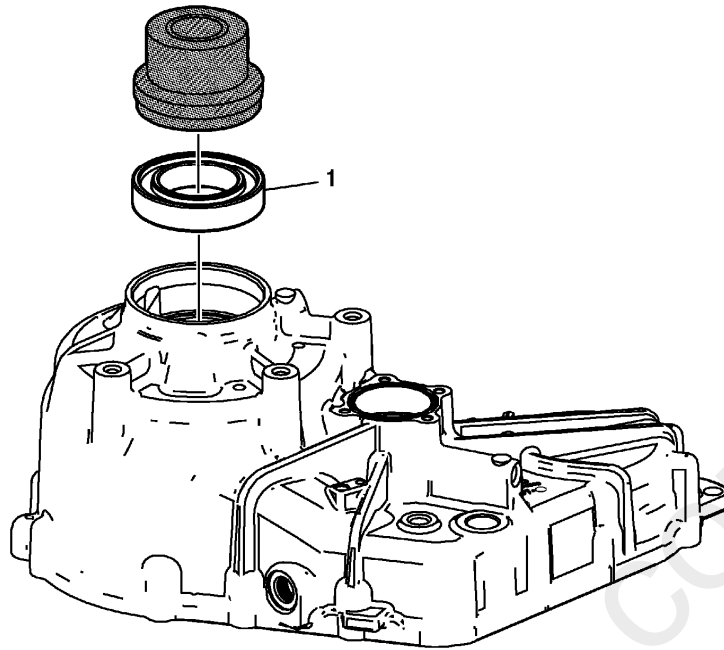


Fig. 59: Rear Output Shaft Rear Bearing
 Courtesy of GENERAL MOTORS COMPANY

Rear Output Shaft Rear Bearing Installation

Callout	Component Name
1	Rear Output Shaft Rear Bearing Special Tools J-33142 Bearing and Seal Installer For equivalent regional tools, refer to Special Tools .

Idler Gear Rear Bearing Race and Front Output Shaft Rear Bearing Installation

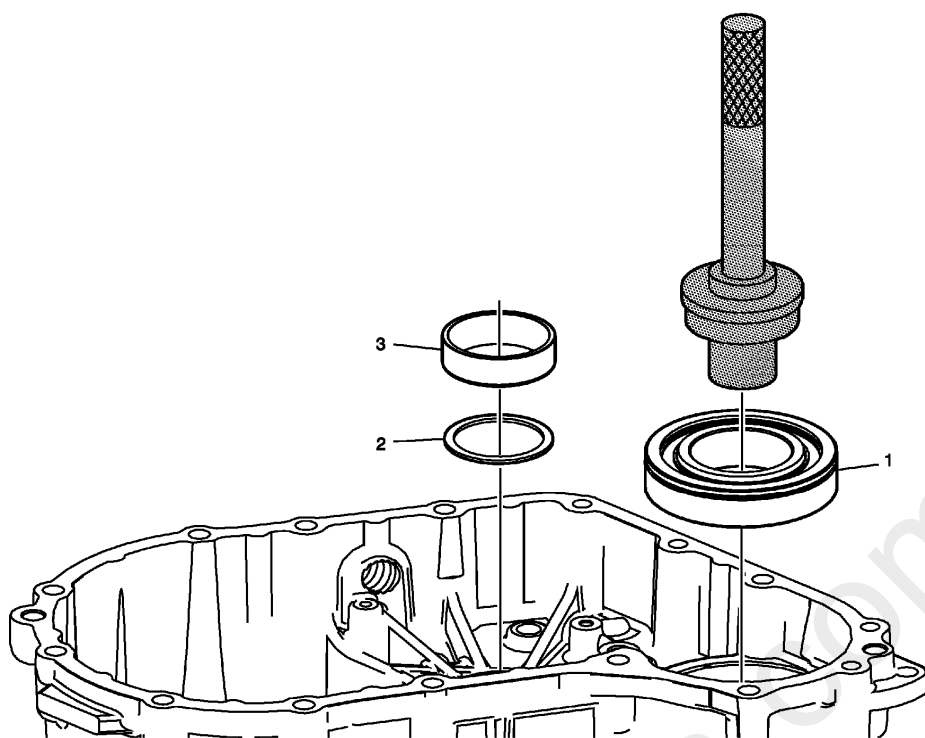


Fig. 60: Idler Gear Rear Bearing Race and Front Output Shaft Rear Bearing
Courtesy of GENERAL MOTORS COMPANY

Idler Gear Rear Bearing Race and Front Output Shaft Rear Bearing Installation

Callout	Component Name
1	Front Output Shaft Rear Bearing Special Tools J-45853 Rear Axle Bearing / Seal Installer For equivalent regional tools, refer to Special Tools .
2	Idler Gear Bearing Shim NOTE: DO NOT remove the idler gear bearing race from the case half. The case halves, idler gear, and idler gear bearings and races are not available as separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.
3	Idler Gear Rear Bearing Race NOTE: DO NOT remove the idler gear bearing race from the case half. The case halves, idler gear, and idler gear bearings and races are not available as separate service parts. If component replacement is required, the transfer case is to be replaced as an assembly.

Oil Baffle, Oil Pump Screen, and Case Half Locating Pin Installation

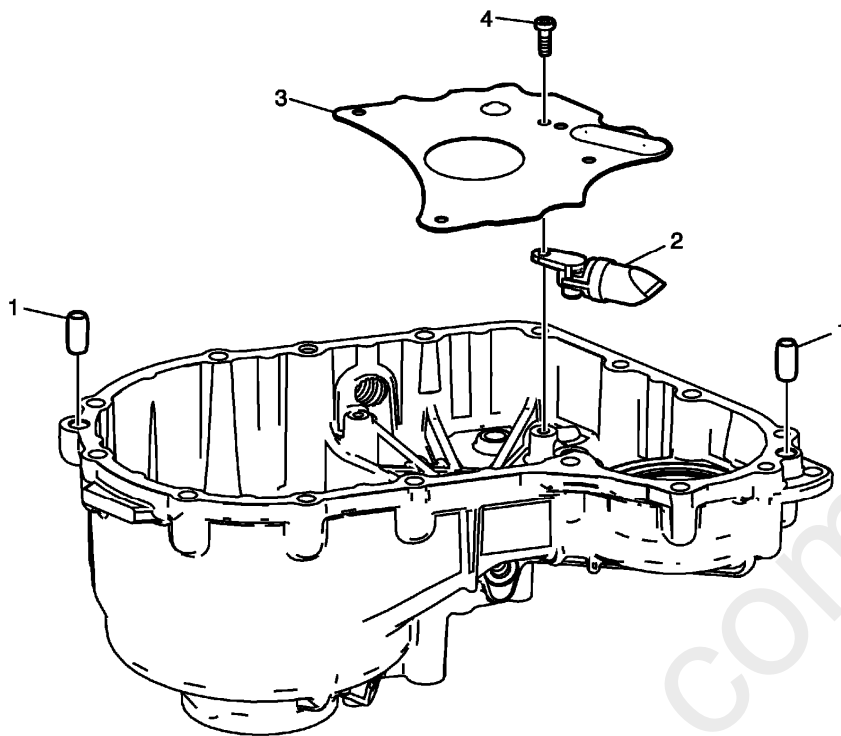


Fig. 61: Oil Baffle, Oil Pump Screen, and Case Half Locating Pin
 Courtesy of GENERAL MOTORS COMPANY

Oil Baffle, Oil Pump Screen, and Case Half Locating Pin Installation

Callout	Component Name
1	Case Half Locating Pin (Qty: 2)
2	Oil Pump Screen
3	Oil Baffle
4	Oil Baffle Bolt (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 8 (71 lb in)

Two/Four Wheel Drive Clutch Coil Installation

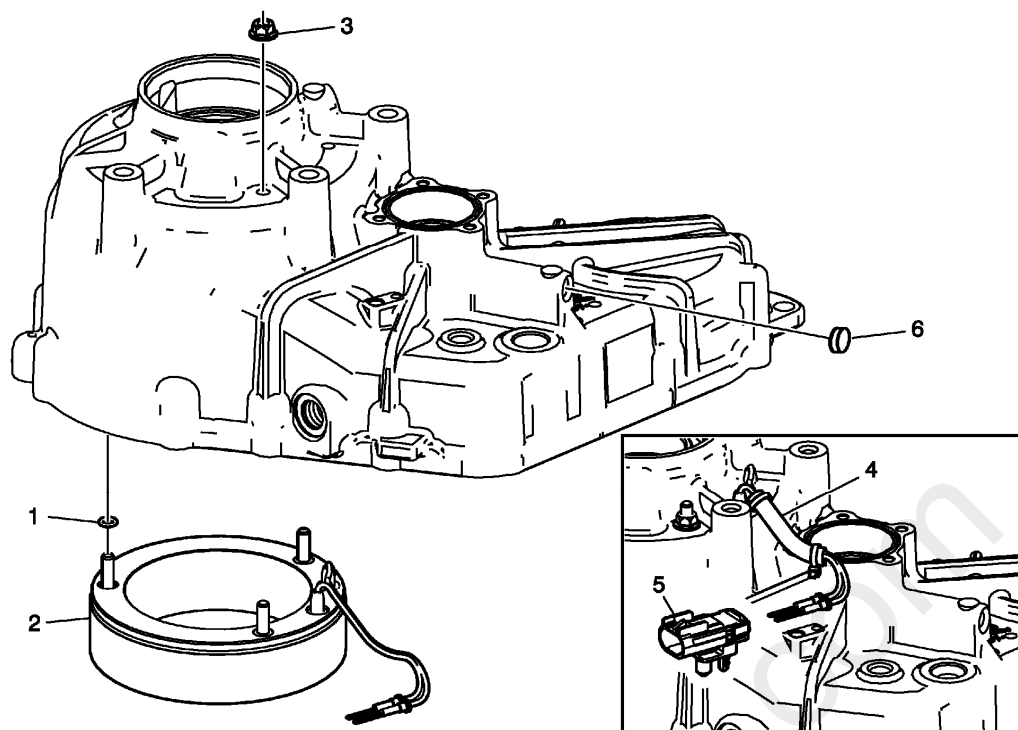


Fig. 62: Two/Four Wheel Drive Clutch Coil
 Courtesy of GENERAL MOTORS COMPANY

Two/Four Wheel Drive Clutch Coil Installation

Callout	Component Name
1	Clutch Coil Stud O-ring Seals NOTE: The clutch coil stud O-ring seals are not serviceable separately. If seal damage is present, replace the clutch coil assembly.
2	Two/Four Wheel Drive Clutch Coil NOTE: Carefully slide the wires through the holes in the case to avoid damage to the wire coating.
3	Coil Nut CAUTION: Refer to <u>Fastener Caution</u> . Tighten 10 (89 lb in)
	Conduit

4	NOTE: Slide the conduit over the synchronizer coil wires to install.
5	Two/Four Wheel Drive Inline Wiring Connector NOTE: Insert the wires into the connector and install the connector assembly.
6	Pump Plug NOTE: Install a new pump plug as required.

Oil Distribution Hub Installation

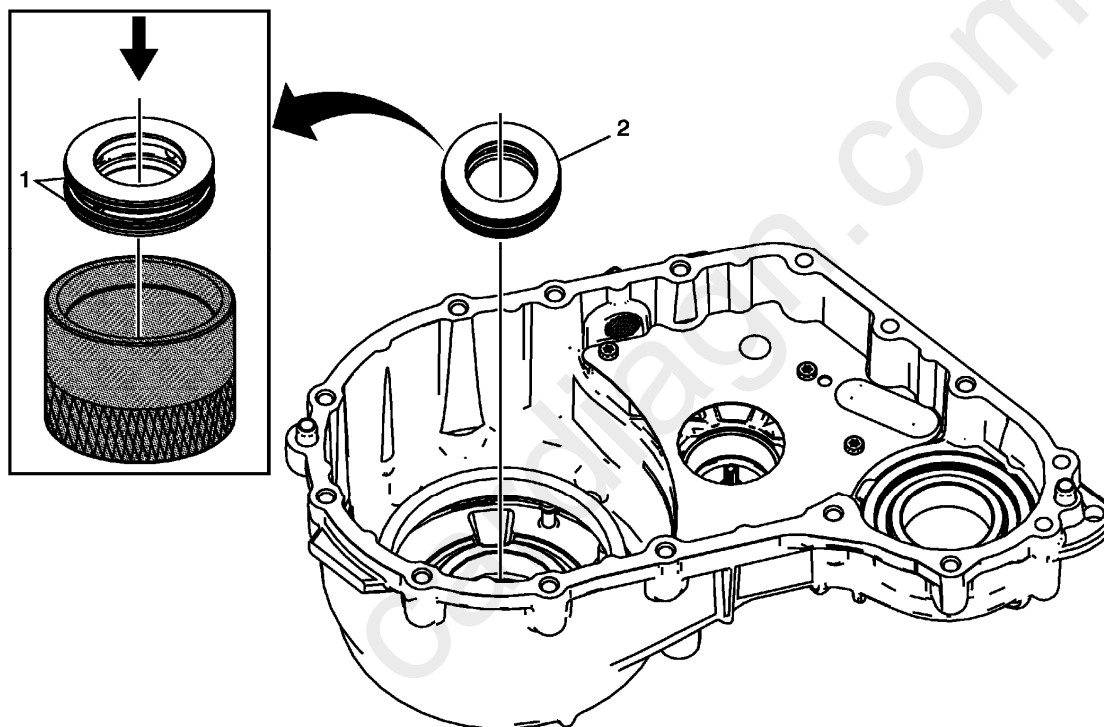


Fig. 63: Oil Distribution Hub

Courtesy of GENERAL MOTORS COMPANY

Oil Distribution Hub Installation

Callout	Component Name
	Oil Distribution Hub Seals
	Procedure 1. Lubricate the hub seals with transfer case fluid prior to performing the sizing procedure.

1	2. The seal sizing procedure must be performed to ensure proper fit and sealing of the hub to the rear case seal bore. NOTE: The oil distribution hub seals are not available as separate service parts. If seal damage is present, the hub and seals must be replaced as an assembly. Special Tools DT-50978 Seal Sizer For equivalent regional tools, refer to Special Tools.
2	Oil Distribution Hub Procedure 1. Lubricate the OD of the oil distribution hub with grease to retain it into the rear cover bore. 2. Install the hub into the rear case until seated in the bore. Special Tools J-36850 Transmission Assembly Lubricant For equivalent regional tools, refer to Special Tools.

Rear Case Half Installation

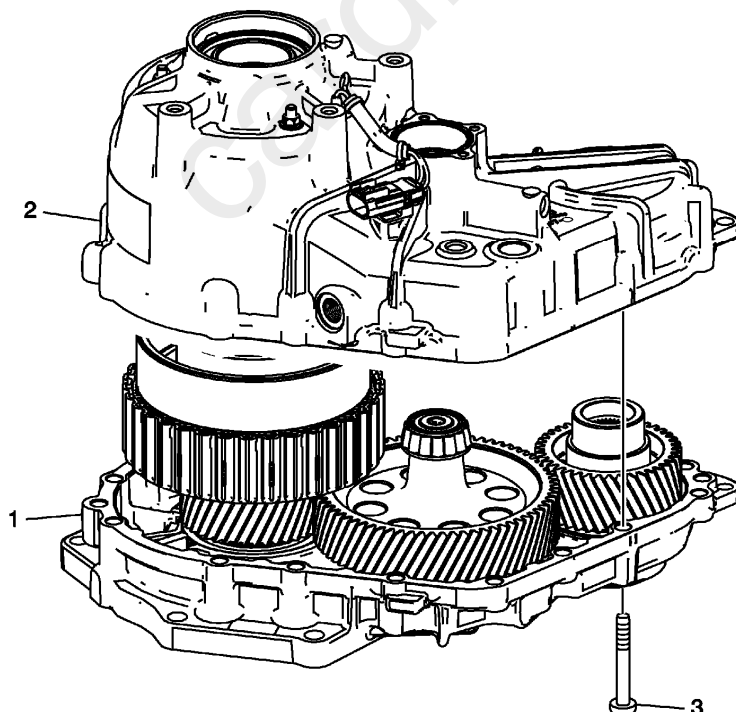


Fig. 64: Rear Case Half

Courtesy of GENERAL MOTORS COMPANY

Rear Case Half Installation

Callout	Component Name
1	Front Case Half CAUTION: Apply the proper amount of the sealant when assembling this component. Excessive use of the sealant can prohibit the component from sealing properly. A component that is not sealed properly can leak leading to extensive engine damage. Procedure 1. Ensure both sealing surfaces of the front and rear case halves are free of dirt, oil and cleaning solvent. 2. Apply a 3-4 mm (0.12-0.16 in) bead of sealant to the sealing service of the front case half. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u>.
2	Rear Case Half
3	Case Half Bolt (Qty: 15) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 36 (27 lb ft)

Vent and Adapter Studs Installation

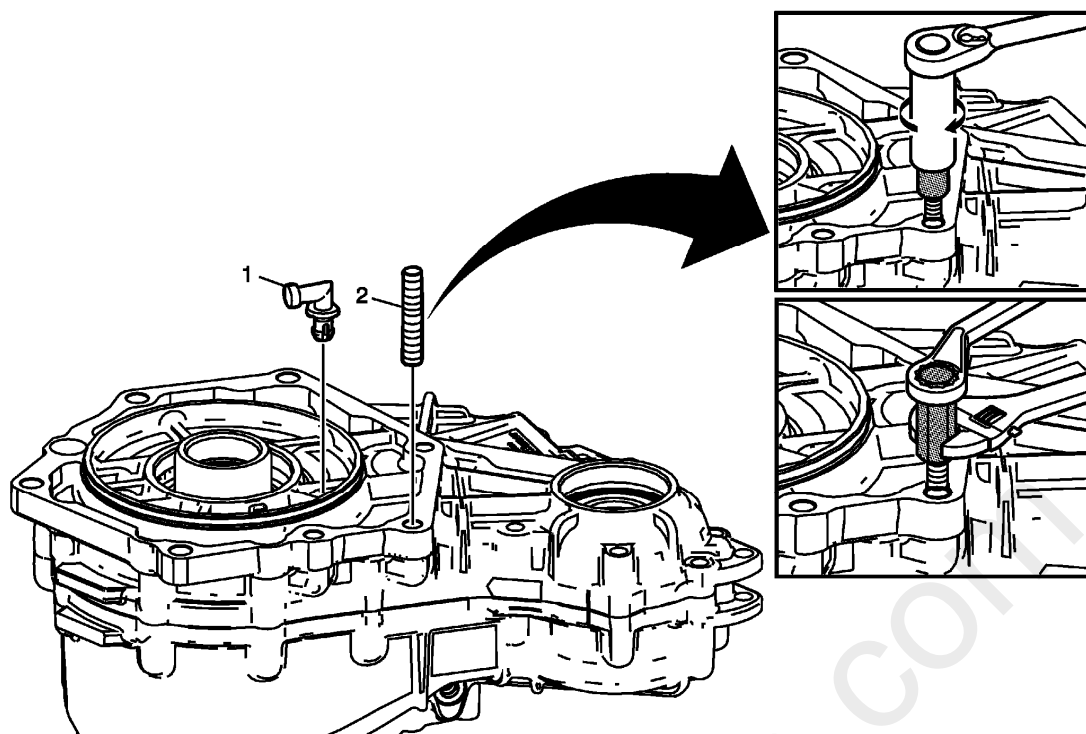


Fig. 65: Vent and Adapter Studs
 Courtesy of GENERAL MOTORS COMPANY

Vent and Adapter Studs Installation

Callout	Component Name
1	Vent NOTE: If the vent has been removed, install a NEW vent during assembly.
2	Transfer Case Stud CAUTION: Refer to <u>Machined Surface Damage Caution</u> . CAUTION: Refer to <u>Fastener Caution</u> . Procedure 1. Apply threadlock to the stud threads before installation. Apply threadlock only to the threads on the end of the stud that will be installed into the transfer case front half. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u> . 2. Install DT 49308 installer onto the stud. 3. Rotate the bolt until it contacts the top of the stud.

4. Install a deep socket over both the head of the bolt and the long nut and tighten the stud to specification.
5. Loosen the long nut and remove the tool from the stud.
6. Inspect the studs for the proper installation height. A properly installed stud should protrude from the face of the case 30.3-31.1 mm (1.19-1.23 in).

Tighten

11 (97 lb in)

Special Tools

DT-49308 Stud Remover and Installer

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

Rear Output Shaft Seal Installation

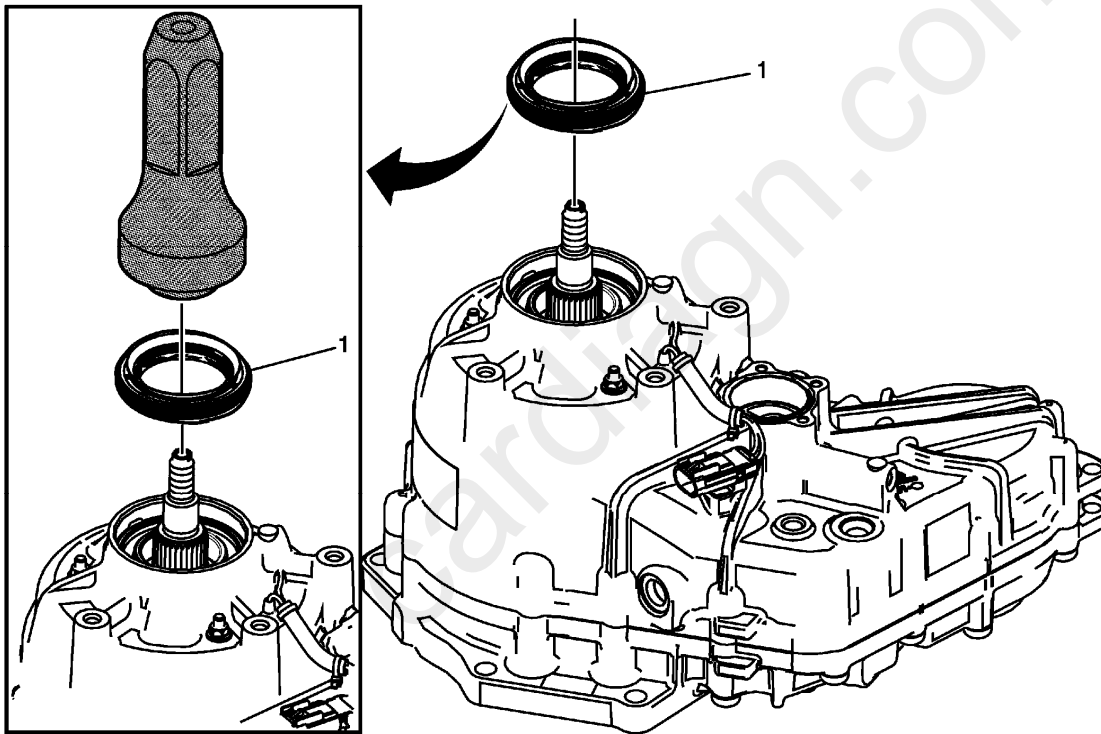


Fig. 66: Rear Output Shaft Seal

Courtesy of GENERAL MOTORS COMPANY

Rear Output Shaft Seal Installation

Callout	Component Name
1	Rear Output Shaft Seal CAUTION: Refer to <u>Machined Surface Damage Caution</u> .

Special Tools
DT-49861-A Seal Installer
For equivalent regional tools, refer to **Special Tools**.

Rear Output Shaft Flange Installation

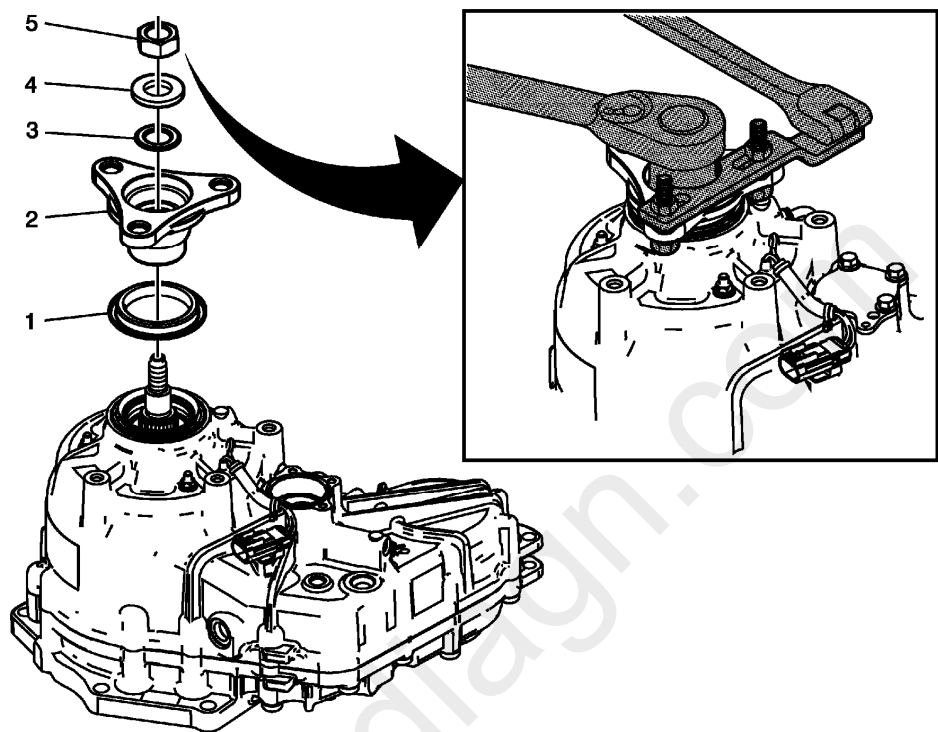


Fig. 67: Rear Output Shaft Flange
Courtesy of GENERAL MOTORS COMPANY

Rear Output Shaft Flange Installation

Callout	Component Name
1	Rear Output Shaft Seal Dirt Deflector Special Tools J-41736 Bearing Installer For equivalent regional tools, refer to Special Tools .
2	Rear Output Shaft Flange Procedure Apply sealant to the rear output shaft flange splines. Refer to Adhesives, Fluids, Lubricants, and Sealers .
3	Rear Output Shaft Flange O-ring Seal
4	Rear Output Shaft Flange Washer
	Rear Output Shaft Flange Nut CAUTION:

5

Refer to **Fastener Caution** .

NOTE:

Use M10 x 1.5 mm nuts and bolts to retain the tool to the flange.

Tighten

160 (118 lb in)

Special Tools

J-45012 Holding Fixture

Oil Delivery Tube and Oil Pump Installation

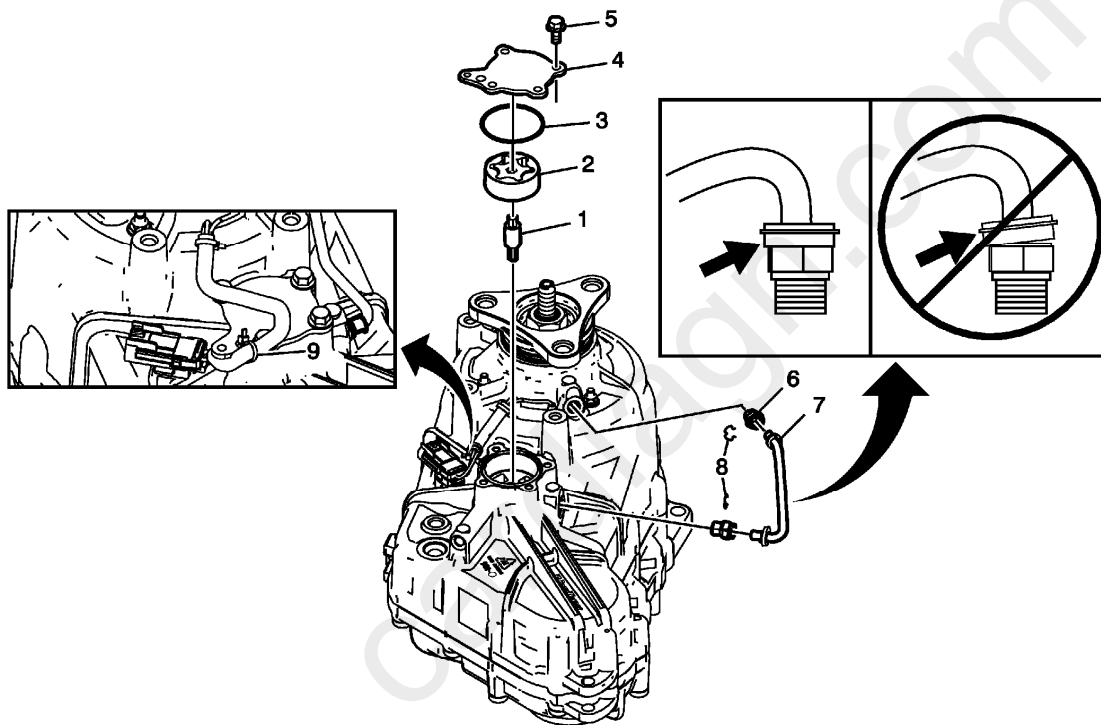


Fig. 68: Oil Delivery Tube and Oil Pump

Courtesy of GENERAL MOTORS COMPANY

Oil Delivery Tube and Oil Pump Installation

Callout	Component Name
1	Oil Pump Shaft
2	Oil Pump Assembly
	Procedure
	Lubricate the gear set components with transfer case oil before installation. Refer to Adhesives, Fluids, Lubricants, and Sealers .
	NOTE:

	The orientation of the gears for assembly. The outer gear is to be installed with the orientation marking facing the oil pump cover.
3	Oil Pump Seal
4	Oil Pump Cover
5	Oil Pump Bolt CAUTION: Refer to <u>Fastener Caution</u> . Procedure Apply sealant to the threads of the cover bolts. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u>. Tighten 10 (89 lb in)
6	Oil Delivery Tube Fitting Tighten 6 (53 lb in)
7	Oil Delivery Tube Procedure 1. Install new fitting clips. 2. Lube the ends of the tube with transfer case fluid. 3. Center the tube ends into the fitting. 4. Push the tube inward toward the transfer case until the tube is fully seated into the fitting. 5. Push the tube cap to the fitting until seated flat. If the cap is not seated flat against the top of the fitting, the tube is not completely installed. Refer to <u>New Product Information</u> for more information regarding design changes to tube.
8	Oil Delivery Tube Fitting Clip
9	Strap NOTE: Secure the coil wire harness to the oil pump cover.

Oil Fill Plug, Drain Plug, and Fluid Temperature Sensor Installation

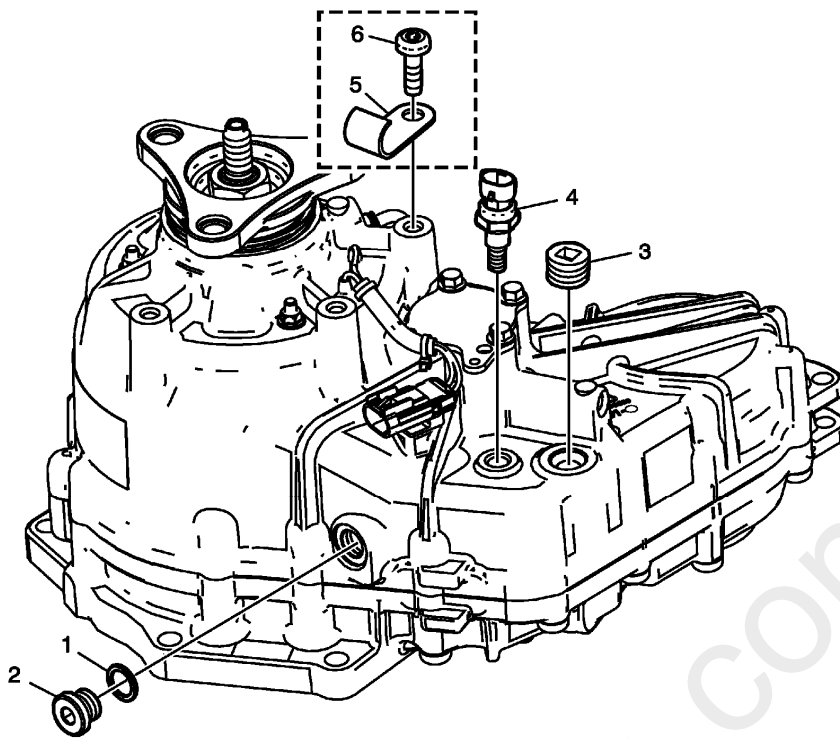


Fig. 69: Oil Fill Plug, Drain Plug, and Fluid Temperature Sensor
 Courtesy of GENERAL MOTORS COMPANY

Oil Fill Plug, Drain Plug, and Fluid Temperature Sensor Installation

Callout	Component Name
1	Oil Fill Plug Seal
2	Oil Fill Plug CAUTION: Refer to <u>Fastener Caution</u> . Tighten 15 (11 lb ft)
3	Oil Drain Plug Procedure Apply sealant to the threads of the drain plug. Refer <u>Adhesives, Fluids, Lubricants, and Sealers</u> . Tighten 25 (18 lb ft)
4	Fluid Temperature Sensor Tighten 22 (16 lb ft)
5	Wiring Harness Clip - Model Dependent
	Wiring Harness Clip Bolt - Model Dependent

6

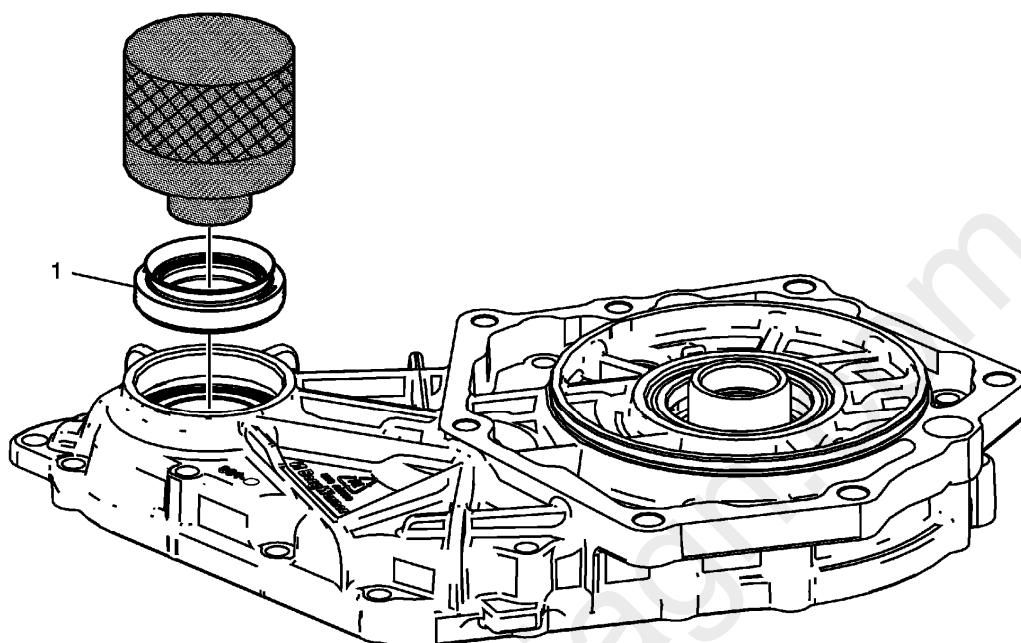
Tighten
36 (27 lb ft)**Front Output Shaft Seal Installation**

Fig. 70: Front Output Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

Front Output Shaft Seal Installation

Callout	Component Name
1	Front Output Shaft Seal CAUTION: Refer to <u>Machined Surface Damage Caution</u> . NOTE: Install the seal until flush with the face of the case. Special Tools J-47847 Output Seal Installer For equivalent regional tools, refer to <u>Special Tools</u>.

Front Output Shaft Installation

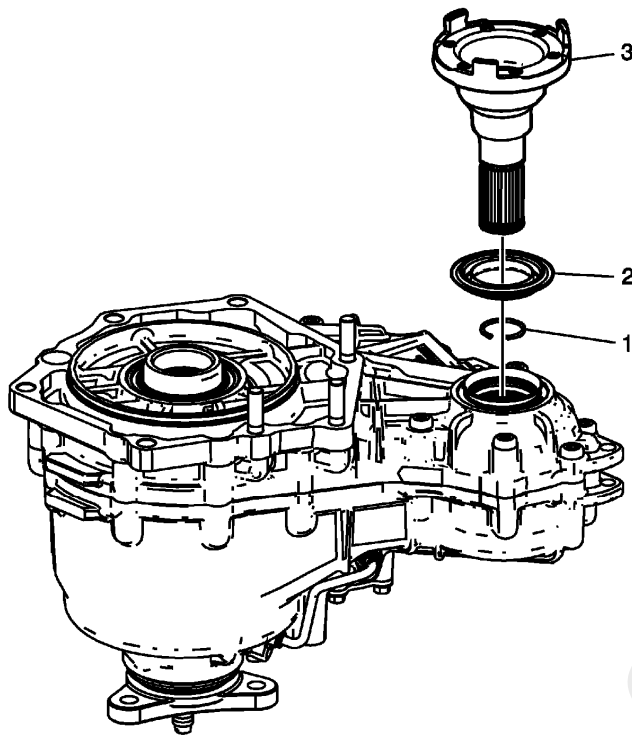


Fig. 71: Front Output Shaft

Courtesy of GENERAL MOTORS COMPANY

Front Output Shaft Installation

Callout	Component Name
1	Front Output Shaft Retaining Ring NOTE: Install a NEW front output shaft retaining ring.
2	Front Output Shaft Seal Dirt Deflector
3	Front Output Shaft NOTE: Use a rubber type mallet to install the shaft and to seat the snap ring into the ID groove of the front output gear

Transfer Case Holding Fixture Removal

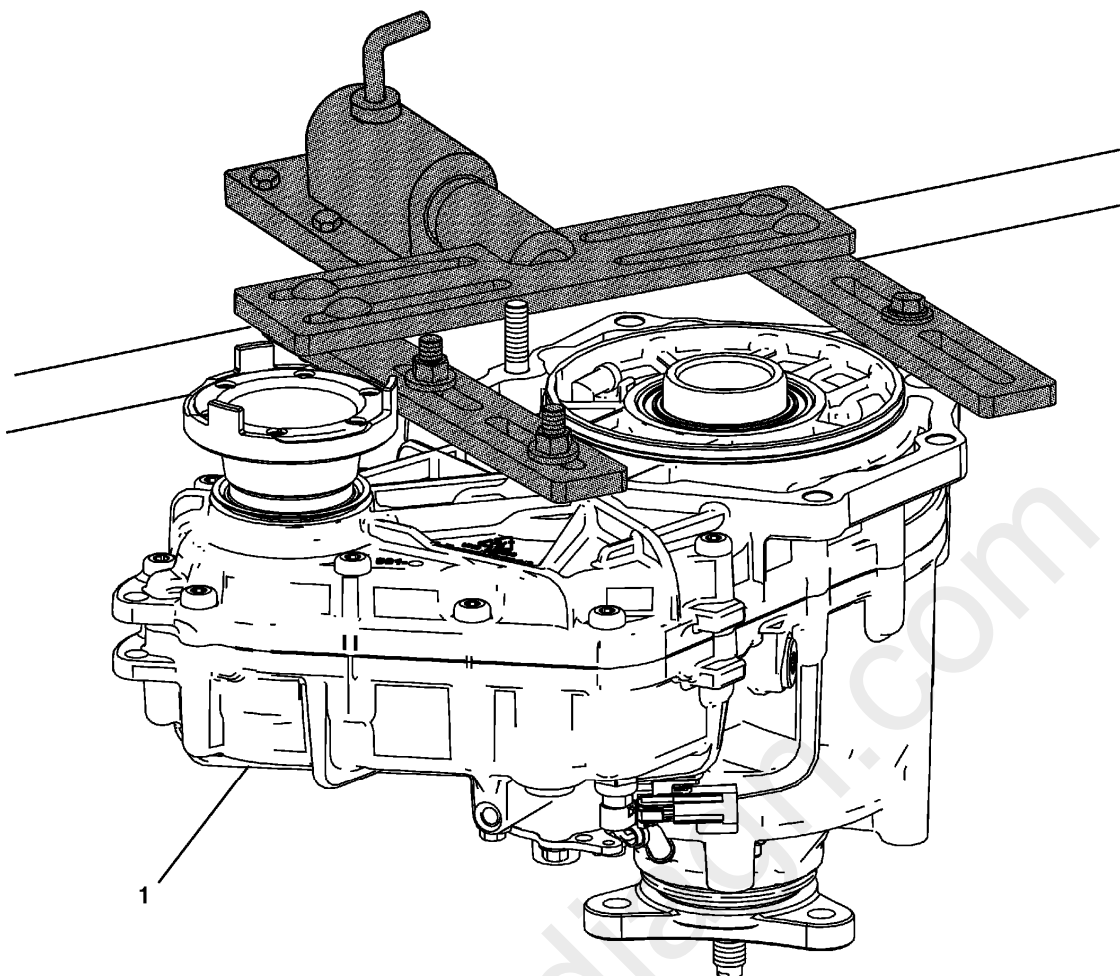


Fig. 72: Transfer Case Holding Fixture
 Courtesy of GENERAL MOTORS COMPANY

Transfer Case Holding Fixture Removal

Callout	Component Name
1	Transfer Case Special Tools • DT-3289-20 Holding Fixture • J-36842 Transaxle Holding Fixture For equivalent regional tools, refer to Special Tools .

Vibration Dampener Installation

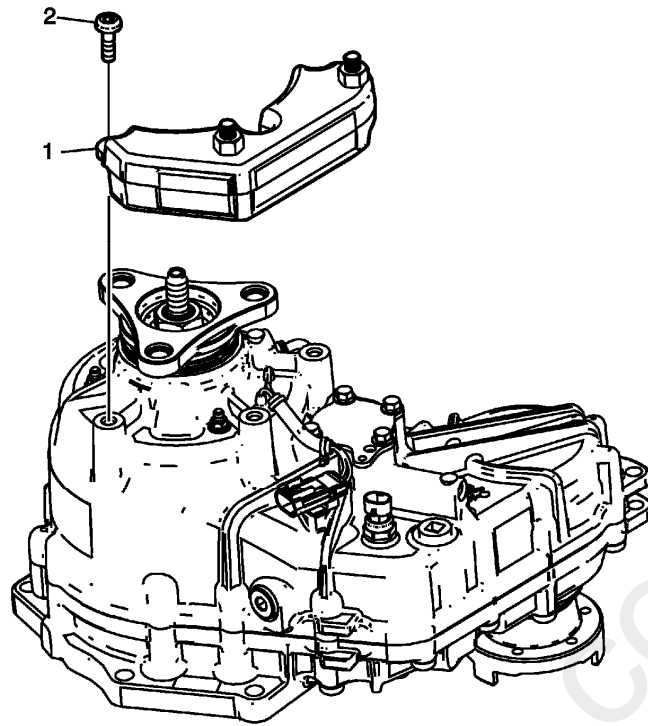


Fig. 73: Vibration Dampener
 Courtesy of GENERAL MOTORS COMPANY

Vibration Dampener Installation

Callout	Component Name
1	Vibration Dampener - Model Dependent
2	Vibration Dampener Bolt - Model Dependent CAUTION: Refer to <u>Fastener Caution</u> . Tighten 36 (27 lb ft)

FOUR WHEEL DRIVE CLUTCH SHIM SELECTION

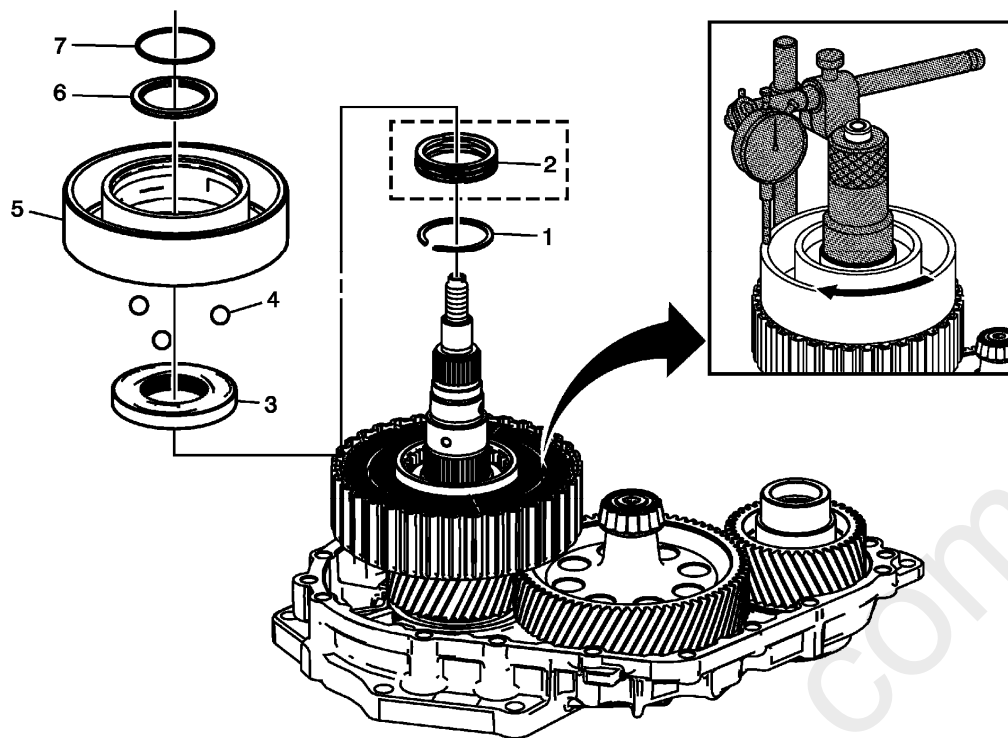


Fig. 74: Four Wheel Drive Clutch Shim
Courtesy of GENERAL MOTORS COMPANY

Four Wheel Drive Clutch Shim Selection

Callout	Component Name
Preliminary Procedures	
1. The purpose of this procedure is to obtain a proper clutch travel of 0.7-1.2 mm (0.0275-0.0472 in.) when assembled with a selective thrust washer. 2. Assemble or disassemble the internal components to the clutch pack snap ring (1). Refer to <u>Transfer Case Front Drive Axle Viscous Clutch Assemble</u>, and <u>Transfer Case Assemble</u>.	
1	Two/Four Wheel Drive Clutch Retainer Ring
2	Four Wheel Drive Clutch Spring NOTE: DO NOT install the spring at this time. Temporarily remove the spring for selective thrust washer measurement.
3	Transfer Case Apply Cam
4	Transfer Case Apply Cam Ball (Qty: 3)
5	Two/Four Wheel Drive Clutch Coil Housing
6	Four Wheel Drive Clutch Housing Bearing
	Four Wheel Drive Clutch Shim
	Procedure

1. Attach the **DT-50924** Clutch Pack Measurement Adapter to the input shaft until hand tight.
2. Attach the **J-8001** Dial Indicator.
3. Zero the **J-8001** Dial Indicator on the rotor assembly in the "free state" assembled position.
4. Rotate the rotor counter clockwise using moderate hand pressure until it stops. Record this measurement.
5. The ideal selected spacer will create the preferred rotor travel value of 0.95 mm (0.0375 in.) The allowable travel range is 0.7-1.2 mm (0.0275-0.0472 in).
6. The selective spacer requires verification before proceeding.
 1. Remove the **DT-50924** Clutch Pack Measurement Adapter.
 2. Remove the installed spacer and install a selected spacer of the correct thickness.
 3. Install **DT-50924** Clutch Pack Measurement Adapter and re-measure the rotor travel.

Refer to **Spacer and Shim Specifications** for a list of available shim sizes.

7. Remove the **J-8001** Dial Indicator and the **DT-50924** Clutch Pack Measurement Adapter.
8. Disassemble the components to the clutch pack retaining ring (1).
9. Assemble the internal components to include the selected spacer (7) and spring (2). Refer to **Transfer Case Assemble**.

Special Tools

- **DT-50924** Clutch Pack Measurement Adapter
- **J-8001** Dial Indicator

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

DESCRIPTION AND OPERATION

TRANSFER CASE IDENTIFICATION

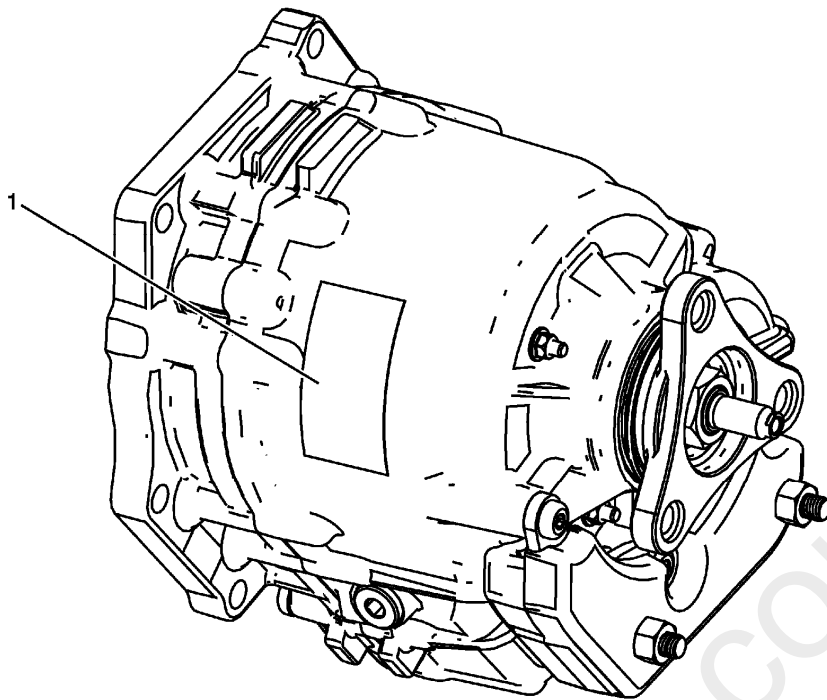


Fig. 75: Transfer Case Identification Label Location
Courtesy of GENERAL MOTORS COMPANY

The transfer case identification label (1) is located on the rear case half at left side of unit.

In situations where transfer case assembly replacement or repair has been performed and reprogramming of the TCCM is required, refer to **Transfer Case Information Label**.

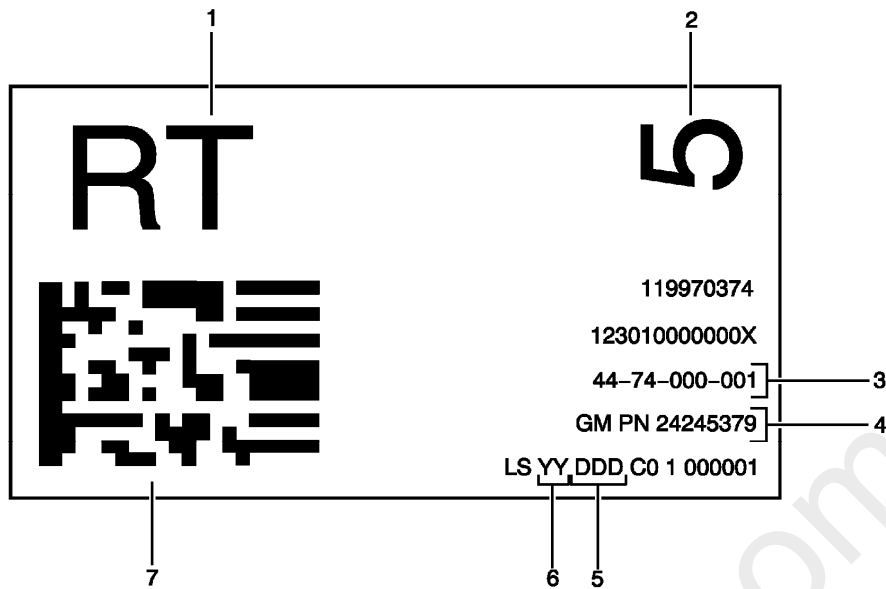


Fig. 76: Transfer Case Identification Label View
Courtesy of GENERAL MOTORS COMPANY

1. Broadcast Code
2. Transfer Case Control Module (TCCM) Clutch Calibration Identification
3. Borg Warner PN
4. GM PN
5. Production Date
6. Production Year
7. Barcode

TRANSFER CASE INFORMATION LABEL

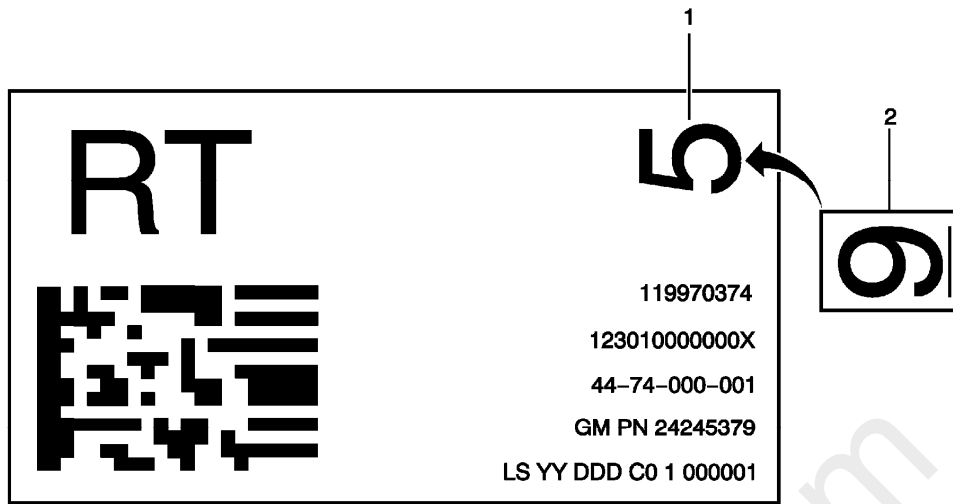


Fig. 77: Transfer Case Information Label
Courtesy of GENERAL MOTORS COMPANY

The Transfer Case Control Module (TCCM) calibration can be identified by the clutch calibration identification number (1) located on the transfer case assembly label. There are 9 variations of production TCCM programming.

- In situations where the transfer case assembly is replaced, the TCCM is to be reprogrammed to the clutch calibration value (1 - 9) as indicated on the NEW transfer case assembly label.
- In situations where the transfer case assembly is repaired and the clutch pack assembly has been replaced, reprogramming of the TCCM is required using the service calibration (variation 9). After completing TCCM re-calibration, the service calibration label (2) is to be installed onto the production label. The service calibration label is to be installed on top of the existing calibration identification. The service calibration label can be identified as having a red background color and the number 9 black in color.
- In situations where only the TCCM is replaced, the TCCM needs to be reprogrammed to the correct clutch calibration value (1 - 9) as identified on the transfer case assembly label.

TRANSFER CASE DESCRIPTION AND OPERATION

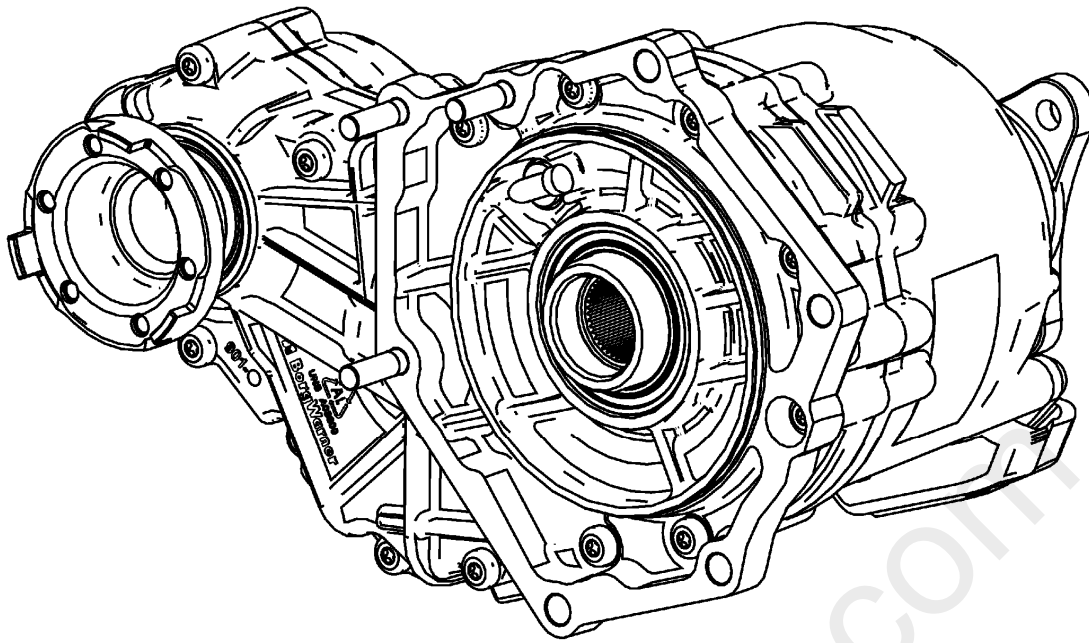


Fig. 78: Transfer Case
Courtesy of GENERAL MOTORS COMPANY

The Borg Warner (BW) model 4474, transfer case is a 1-speed active design.

The BW 4474 transfer case allows vehicle speed dependent flexible clutch preload torque levels for enhanced system performance. An on-demand torque biasing friction clutch is tuned through software calibrations. When a driver enters a turn, clutch torque is decreased based on the various CAN inputs, such as steering angle, to prevent crowhop or driveline binding from occurring at low speeds. If the driver were to accelerate hard enough in a turn to induce rear wheel slip the transfer case would immediately correct it and then reduce torque to prevent crowhop or binding.

The system is fully automatic, requires no driver intervention, and has its own control module integrated with the vehicle chassis control system via the vehicle's CAN bus. The torque split between the front and rear axle is not fixed as in an open center differential transfer case meaning the active transfer case has the ability to transfer up to 100% of available torque to the front axle as needed.

The case halves are die-cast aluminum. Ball bearings support the input shaft and front output gear. Tapered bearings support the idler gear. Power from the input shaft is transferred to the front output shaft via a helical gear set. A gerotor type oil pump is driven by a shaft located into the end of the idler gear assembly. Oil is pulled from the sump through the filter and screen, pumped through the oil distribution hub, and into the input shaft oil gallery for the clutch and bearing lubrication.

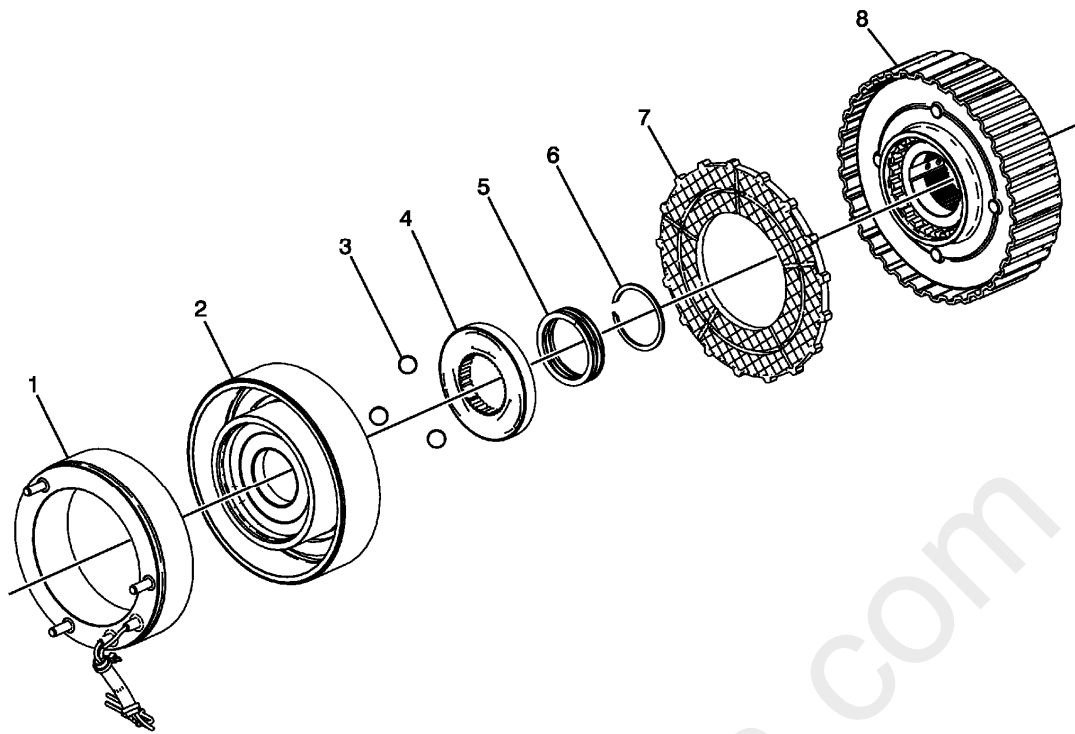


Fig. 79: Clutch Housing/Pack
 Courtesy of GENERAL MOTORS COMPANY

Torque is transferred to the front axle through an active wet clutch within the transfer case. The clutch pack is engaged by an electromagnetic clutch coil and ball ramp assembly. By varying the amount of current, torque output to the front axle can be adjusted.

Whenever the coil (1) is energized as determined by vehicle operating conditions and commanded by TCCM, the armature (7) in the clutch housing is magnetically drawn toward the rotor (2). Torque is generated through friction between the armature and rotor. Friction torque is multiplied through the ball (3) cam (4) mechanism and applied to the clutch pack (8). The clutch pack assembly contains a predetermined selectable pressure plate, friction, and reaction plates that are to be serviced as a clutch pack assembly. Clutch activation is controlled by a pulse width modulated voltage signal. If the clutch pack assembly is replaced, the TCCM must be recalibrated using the service calibration. Refer to **Transfer Case Information Label**.

External Components

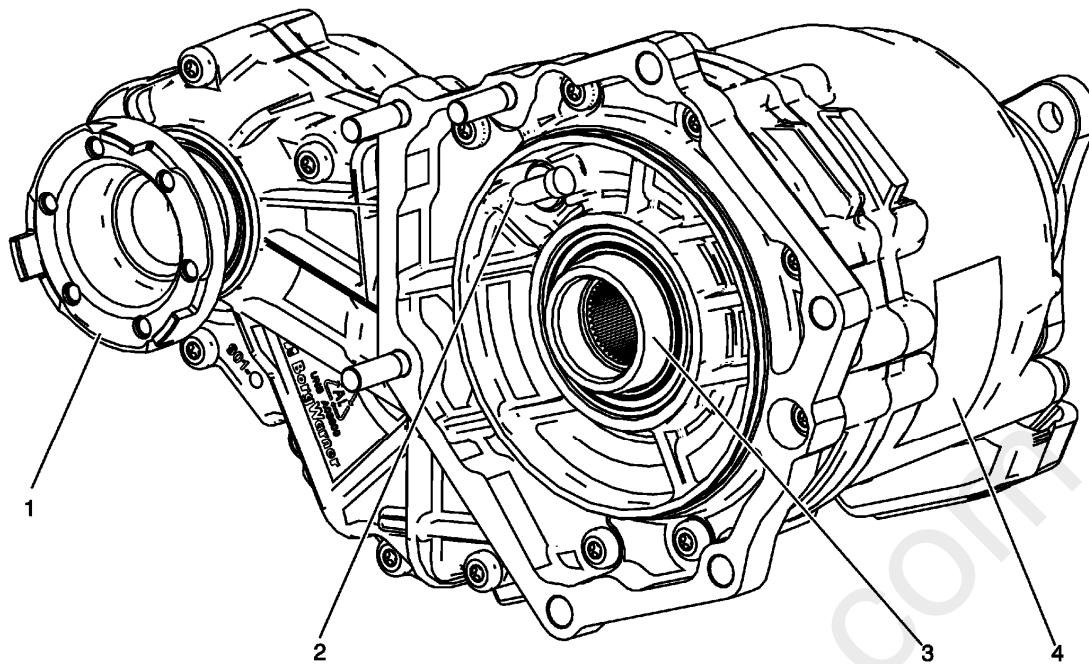


Fig. 80: Transfer Case (1 Of 3)
 Courtesy of GENERAL MOTORS COMPANY

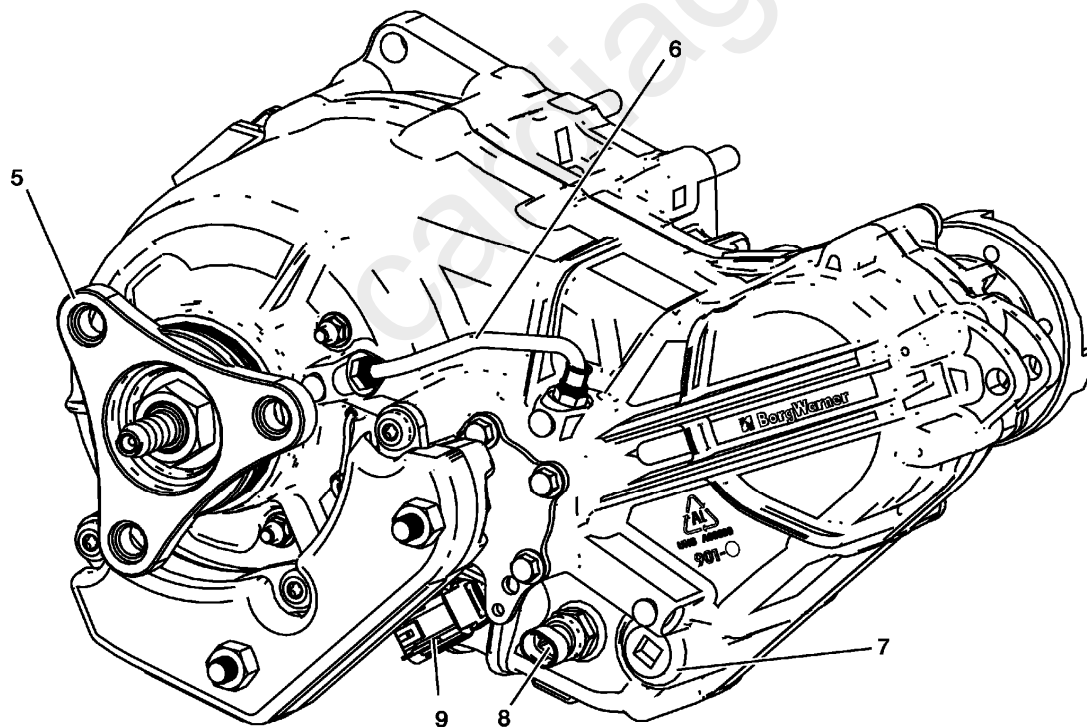


Fig. 81: Transfer Case (2 Of 3)
 Courtesy of GENERAL MOTORS COMPANY

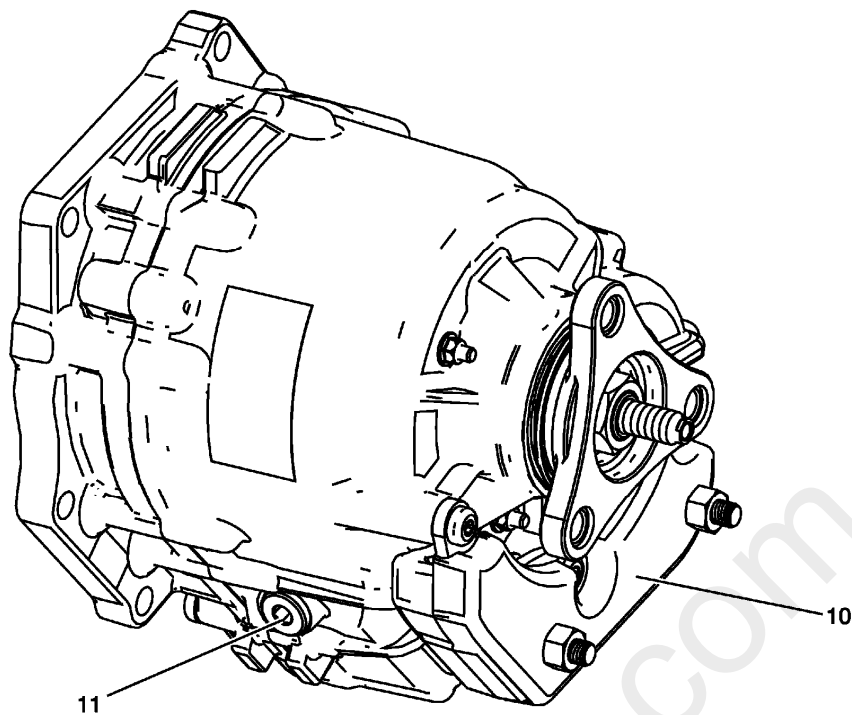


Fig. 82: Transfer Case (3 Of 3)

Courtesy of GENERAL MOTORS COMPANY

1. Front Output Flange
2. Vent
3. Input Shaft
4. Identification Label
5. Rear Output Flange
6. Oil Delivery Tube
7. Oil Drain Plug
8. Fluid Temperature Sensor
9. Two/Four Wheel Drive Inline Wiring Connector
10. Vibration Dampener - Model Dependent
11. Oil Fill Plug

Internal Components

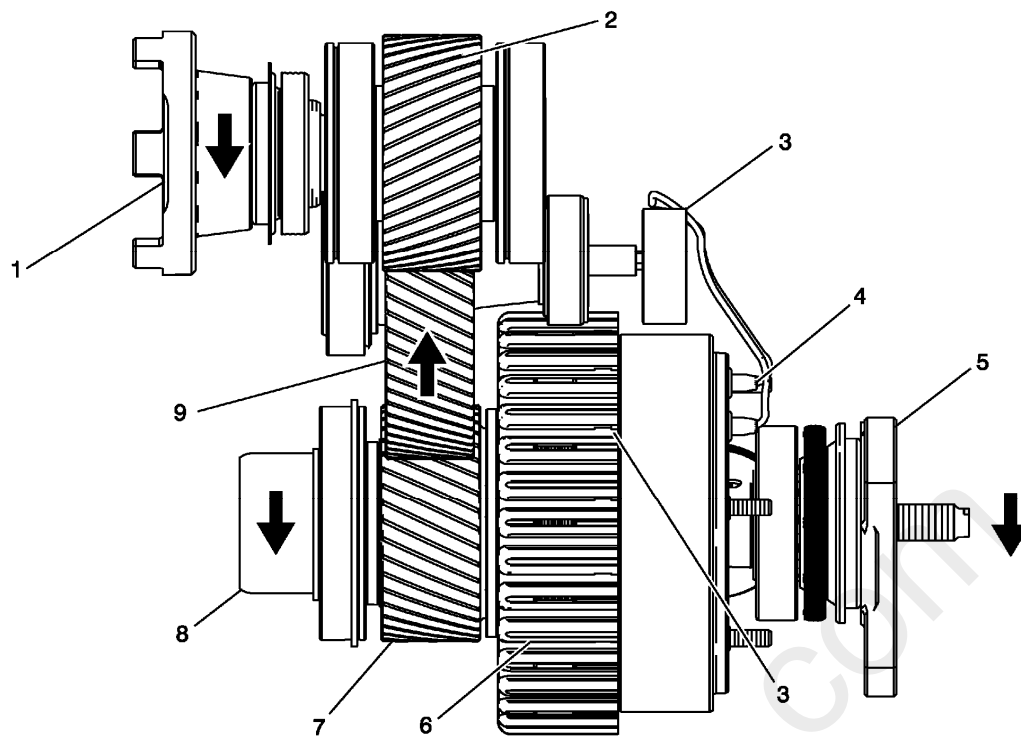


Fig. 83: Cutaway View Of Transfer Case
Courtesy of GENERAL MOTORS COMPANY

1. Front Output Flange
2. Front Output Shaft Gear
3. Oil Pump
4. Two/Four Wheel Drive Clutch Coil
5. Rear Output Flange
6. Front Drive Axle Clutch Assembly
7. Input Gear
8. Input Shaft
9. Idler Gear

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.

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

Interim Model Year Design Change - Second Design Oil Delivery Tube

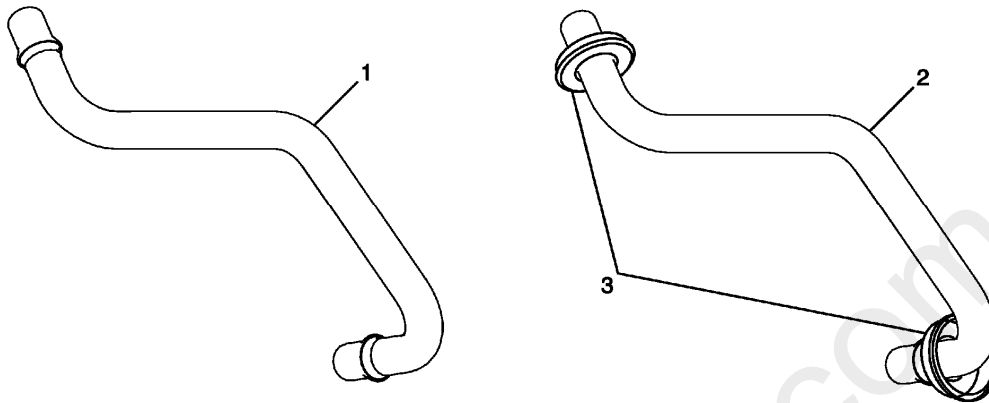


Fig. 84: Identifying Oil Delivery Tube Design
 Courtesy of GENERAL MOTORS COMPANY

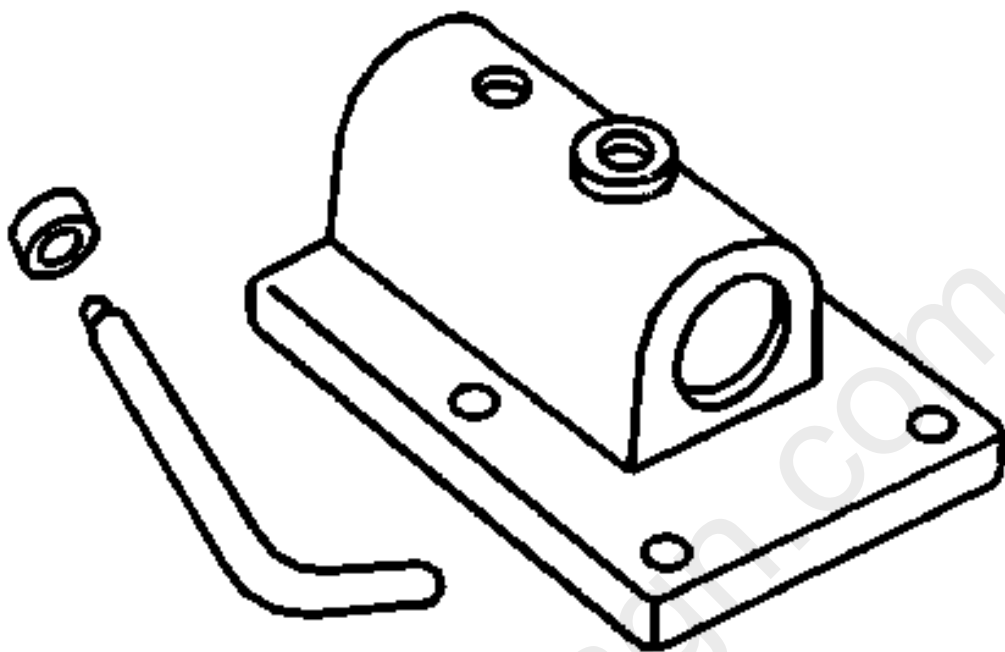
Interim 2013 model year, a new design oil delivery tube was implemented into production. A first design tube (1) can be identified as not having the white plastic inspection caps. A second design tube (2) will include the white plastic inspection caps (3).

The second design tube (2) with inspection caps can be used to back-service on earlier assemblies. The tube caps are to be used as an inspection method to ensure the tube is properly and completely installed into the fittings.

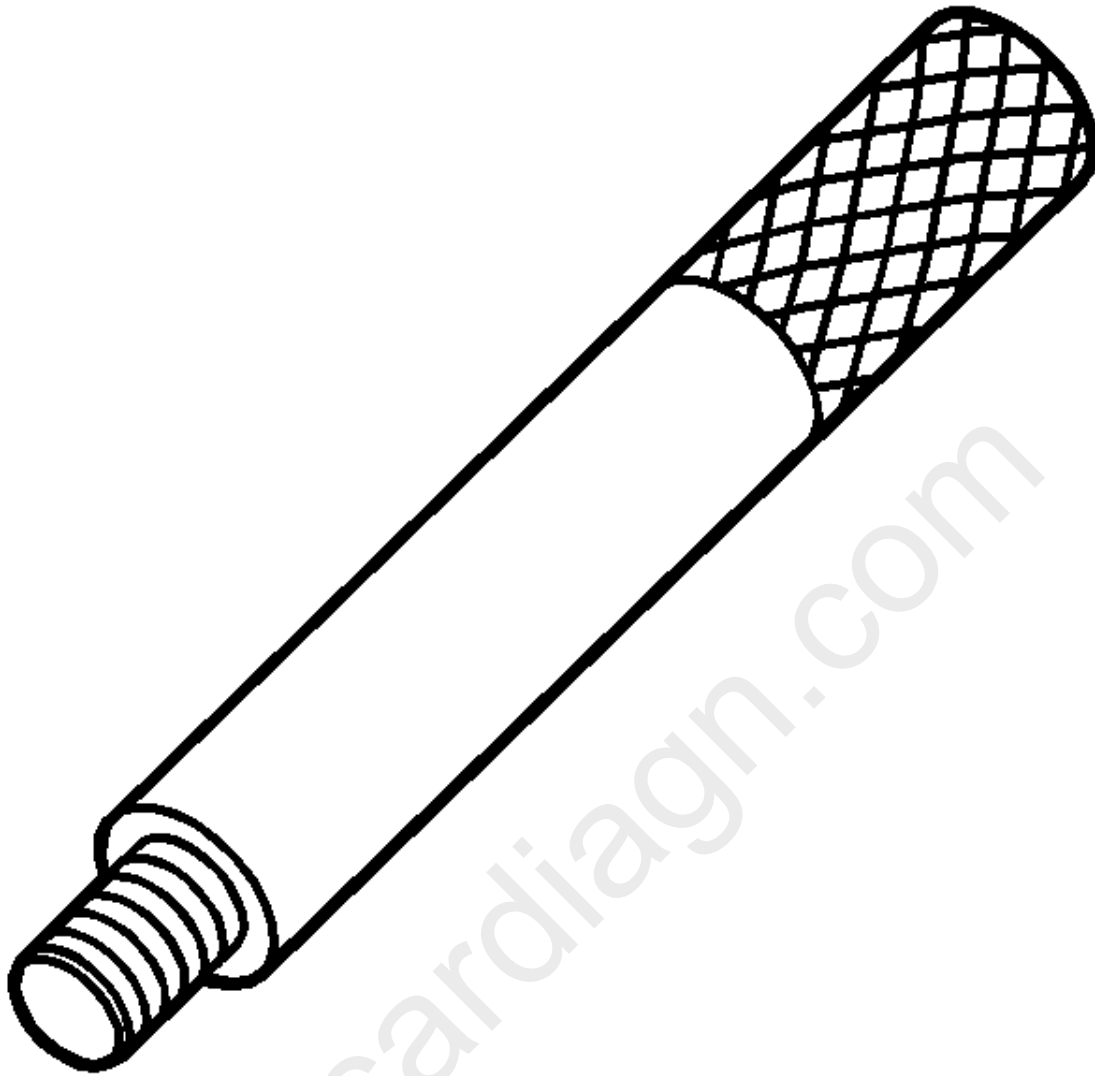
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

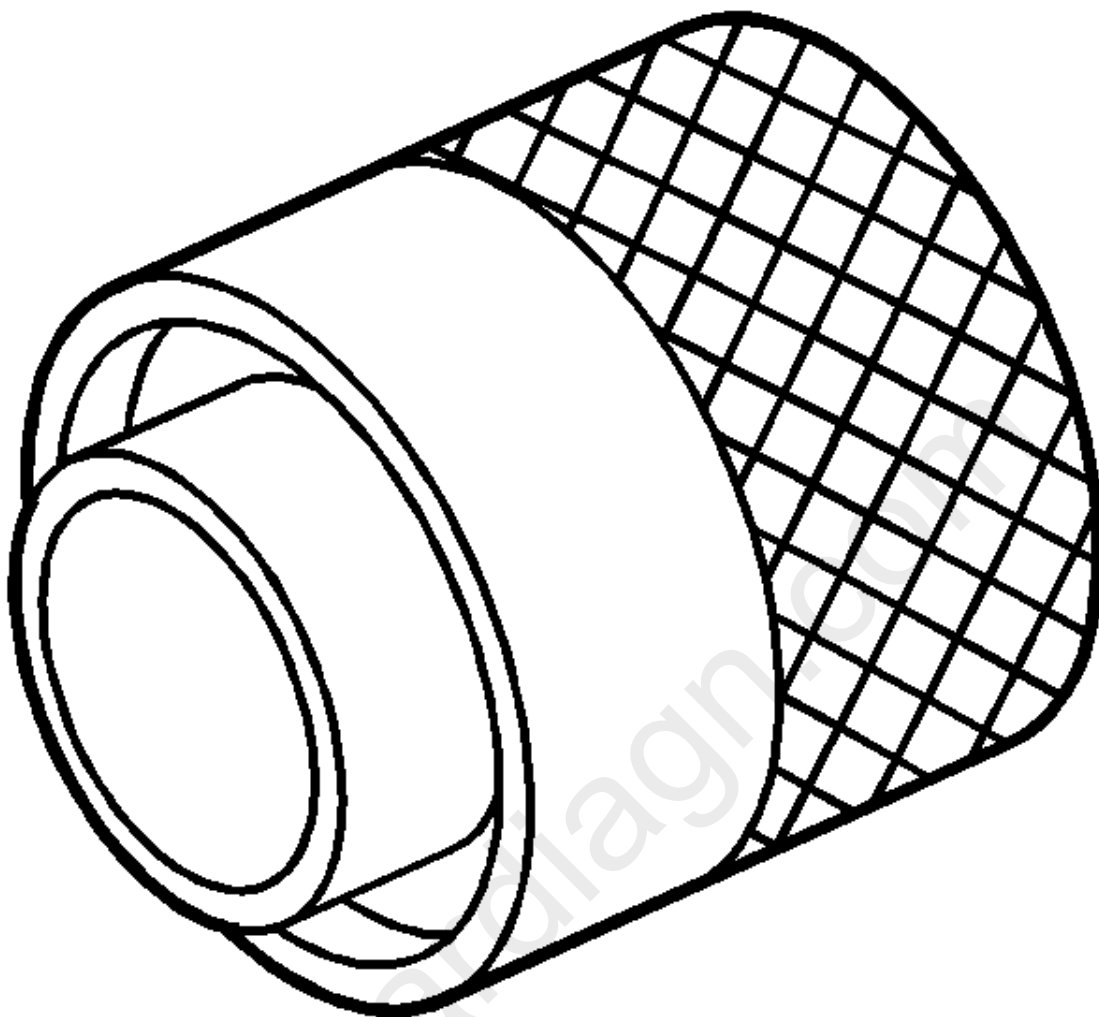
Illustration	Tool Number/Description



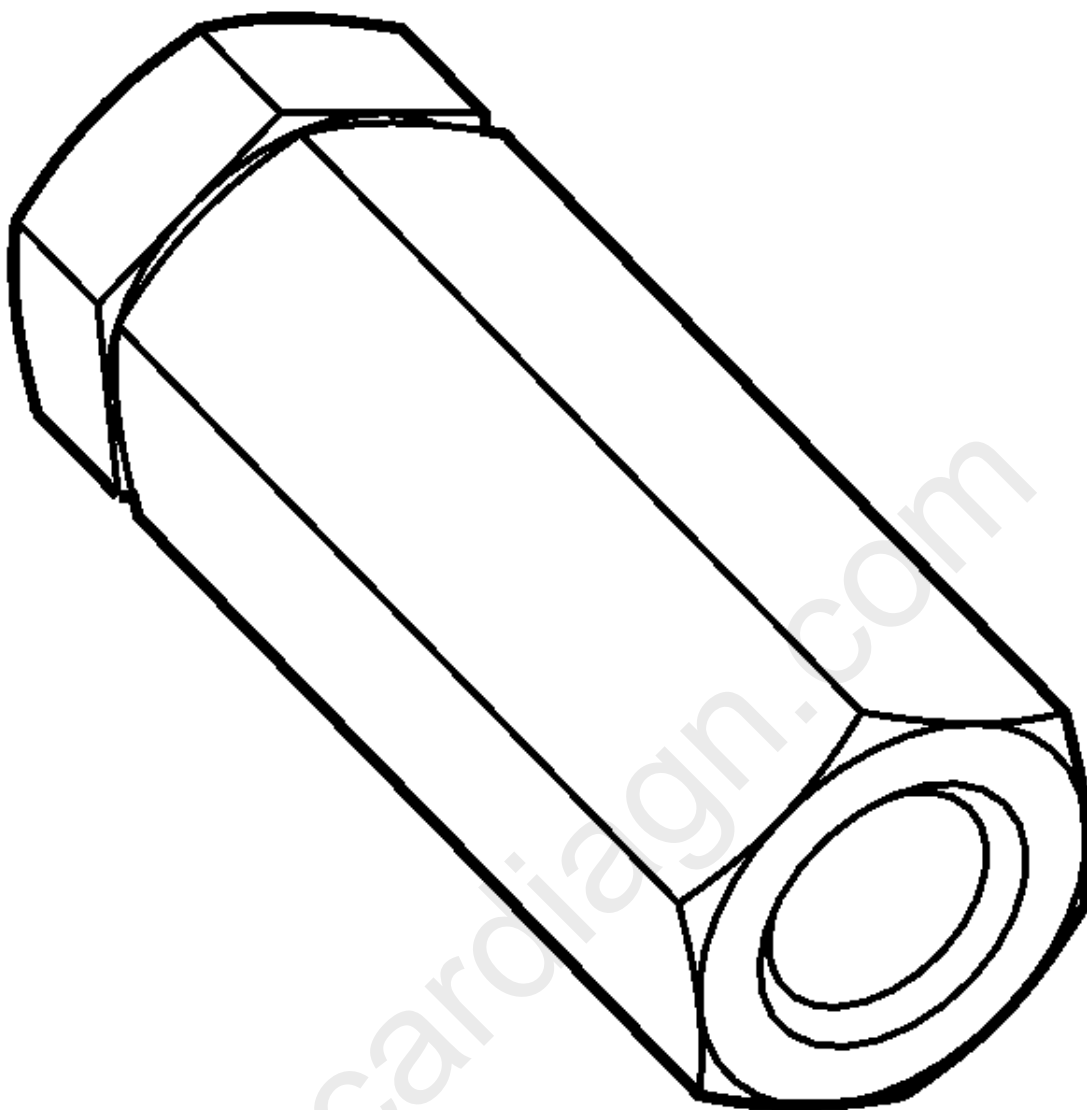
DT-113-2-A
DT-3289-20
KM-113-2
Bracket



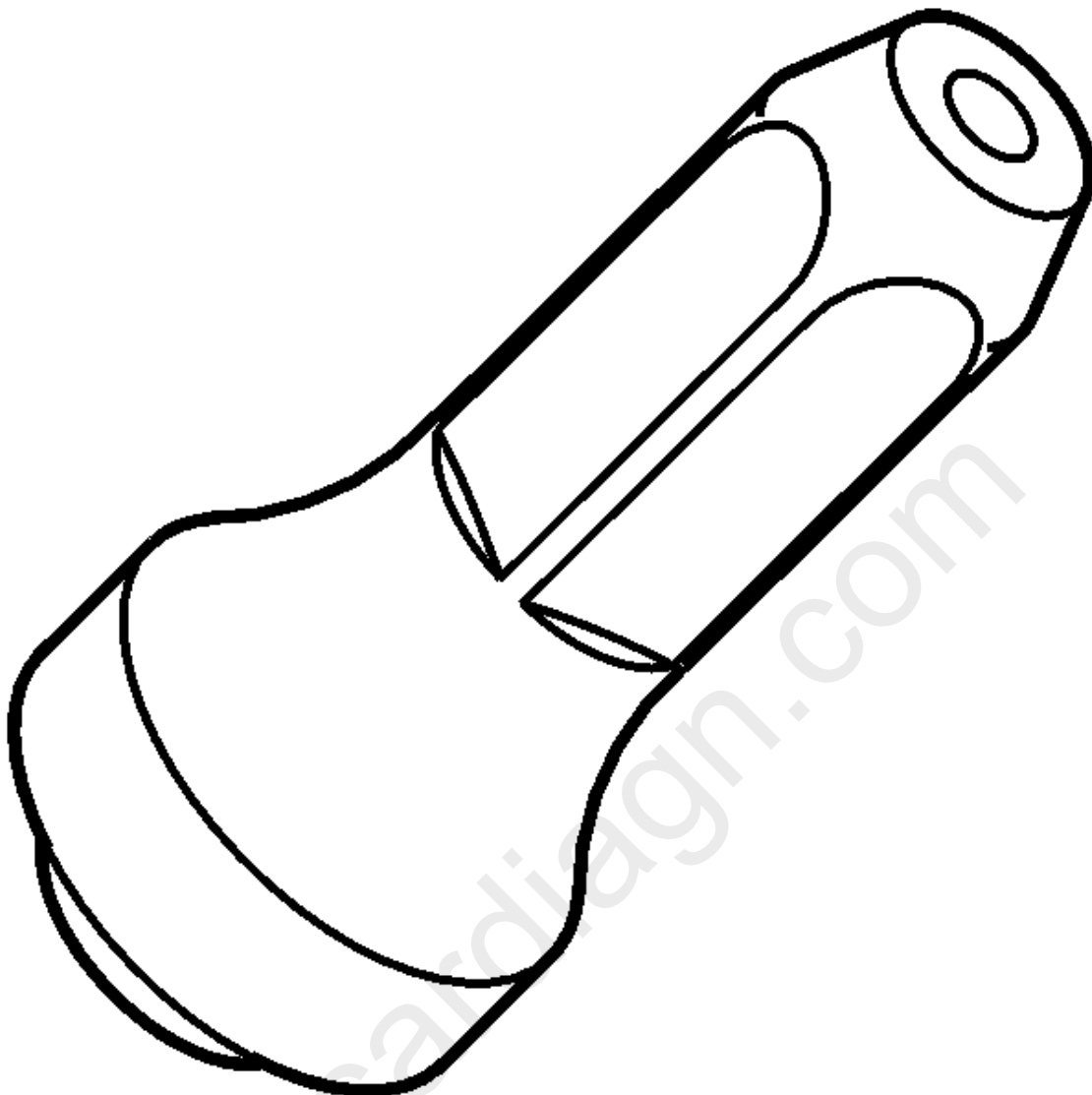
DT-8092
GE-8092
J-8092
Driver Handle



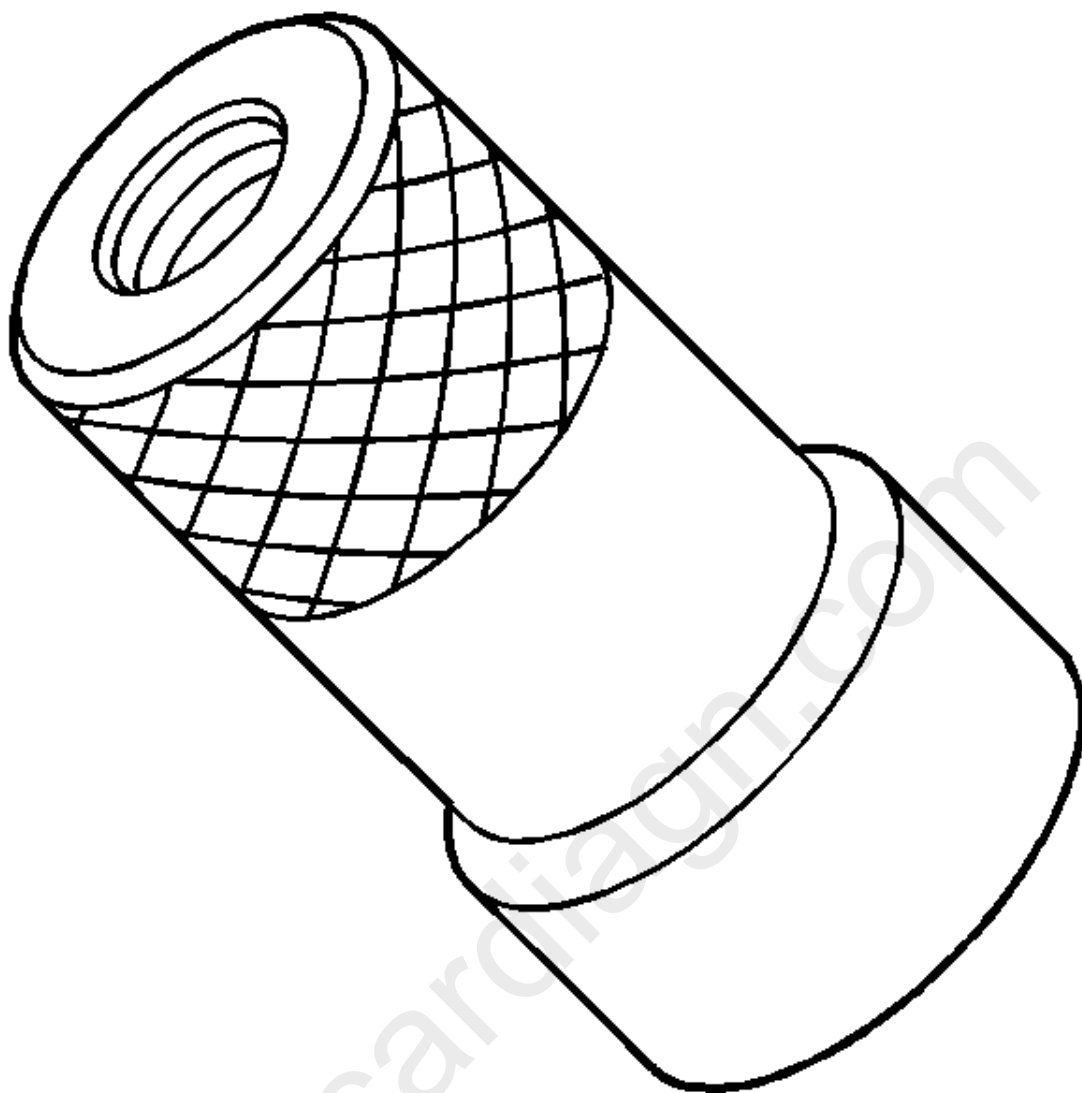
DT-47847
Front Output Shaft
Seal Installer



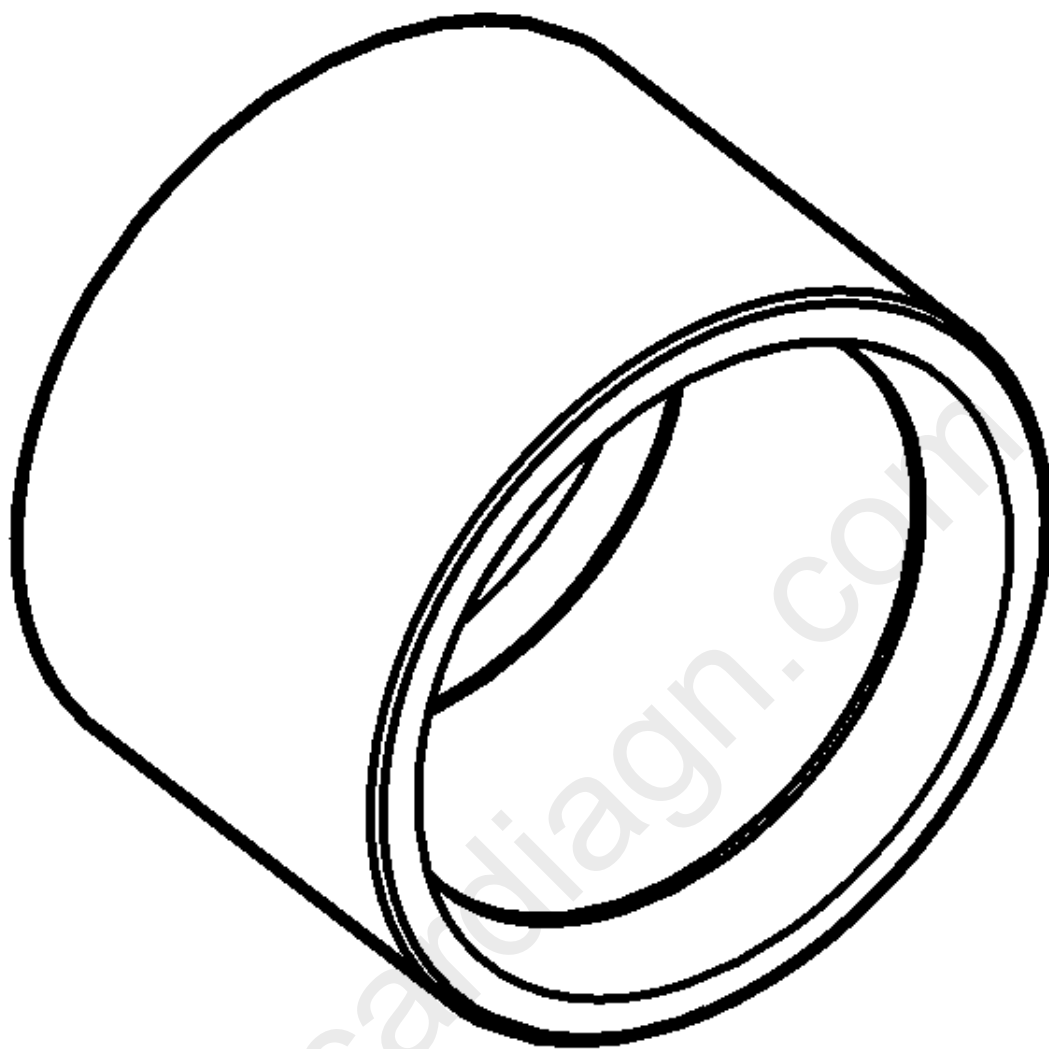
DT-49308
Stud Remover
Installer



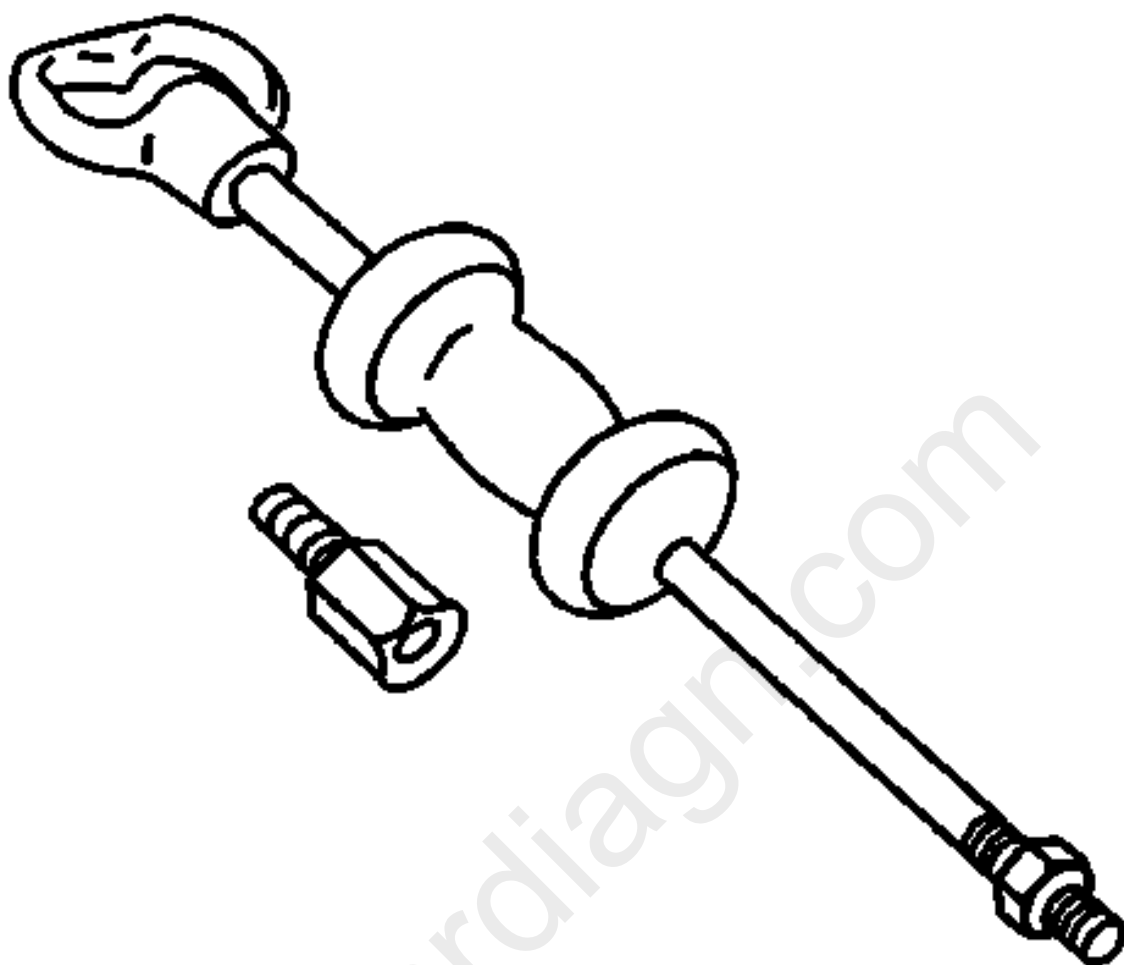
DT-49861-A
Seal Installer



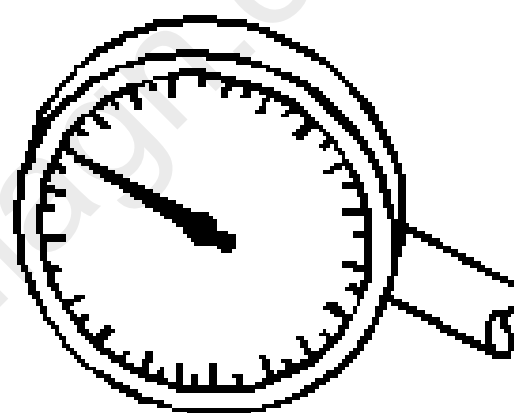
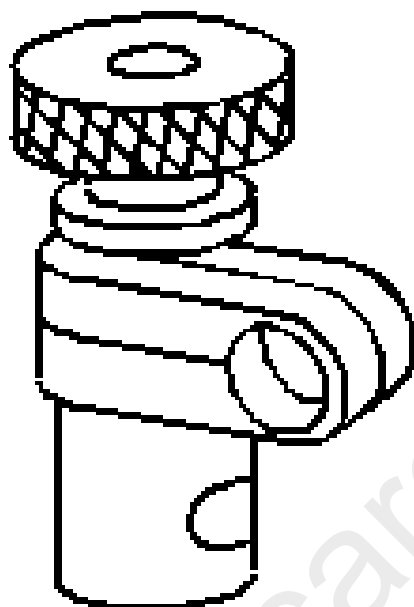
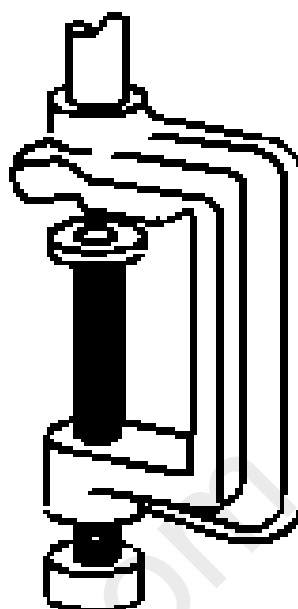
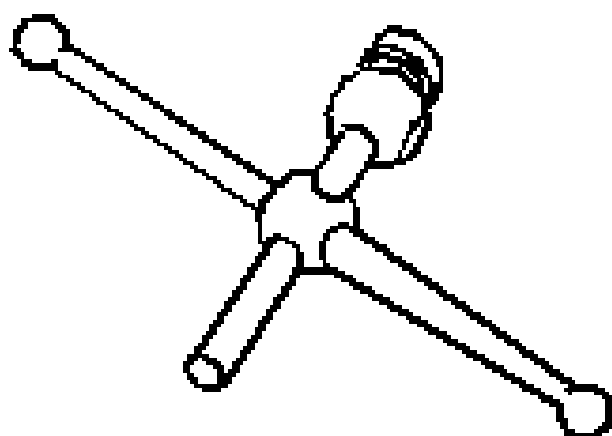
DT-50924
Clutch Pack
Measurement
Adapter



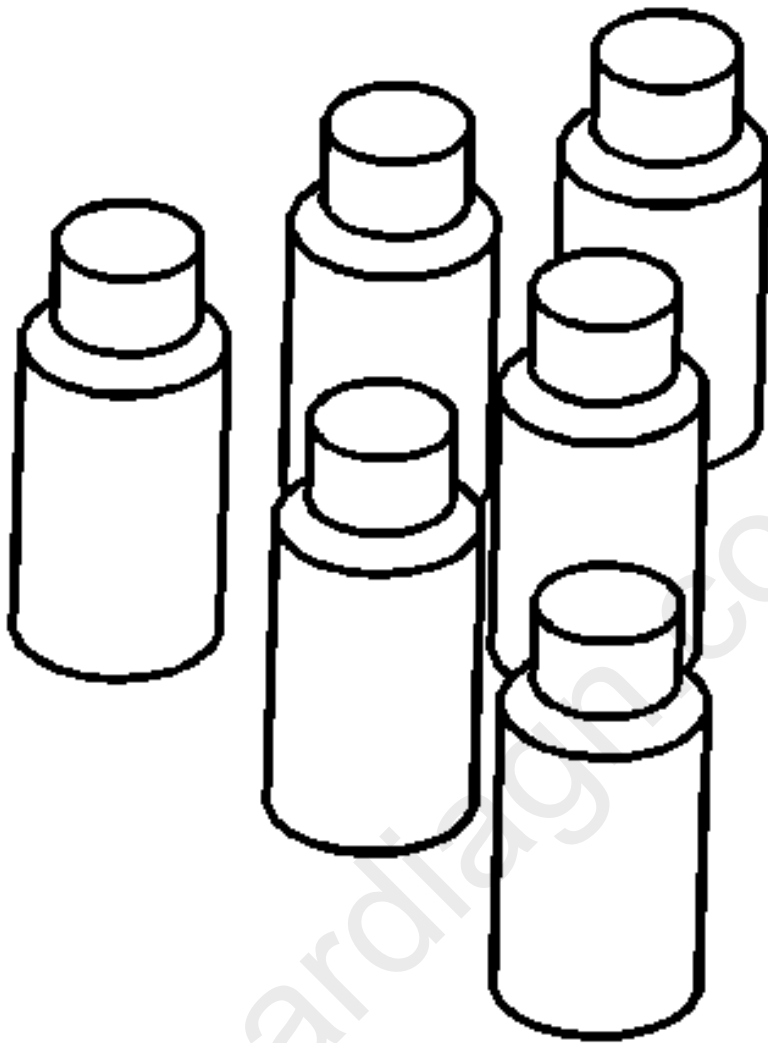
DT-50978
Seal Sizer



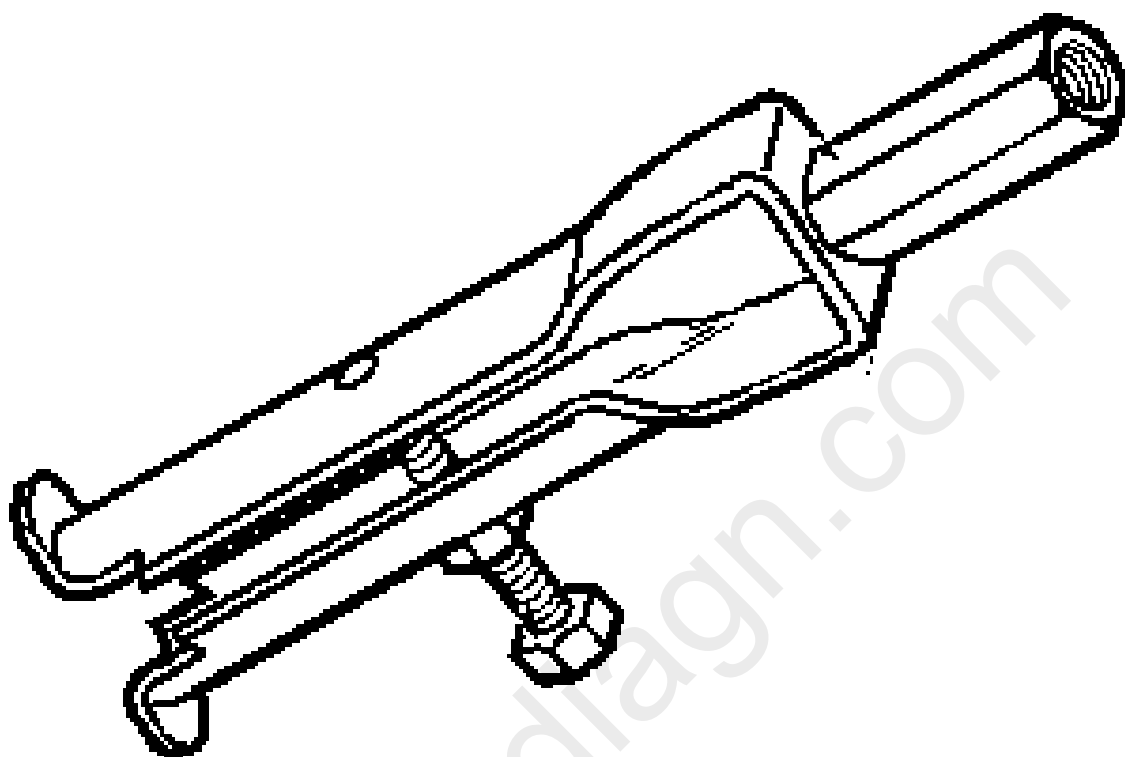
GE-2619-A
J-2619-A
Slide Hammer w
Adapter



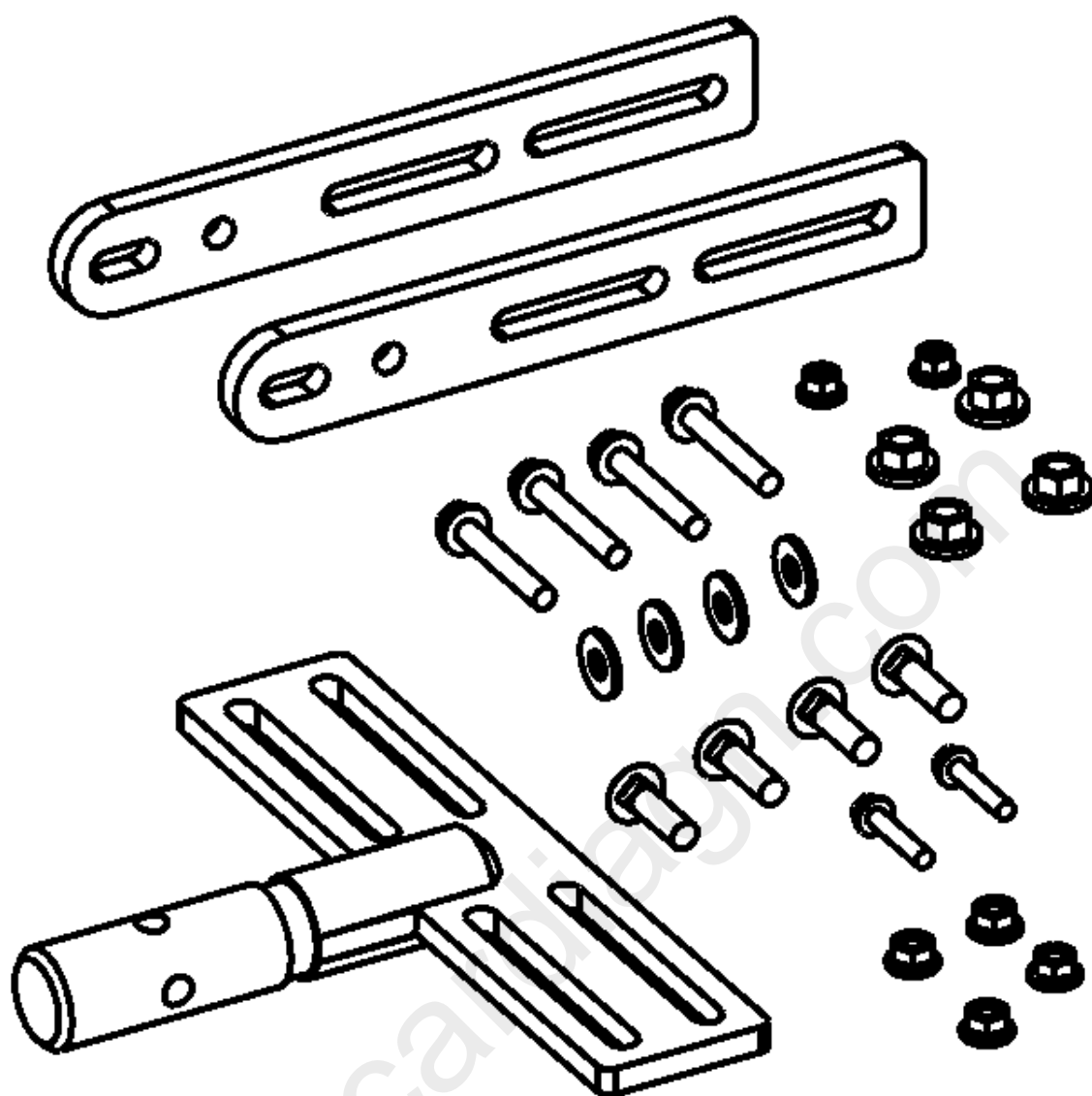
J-8001
Dial Indicator S



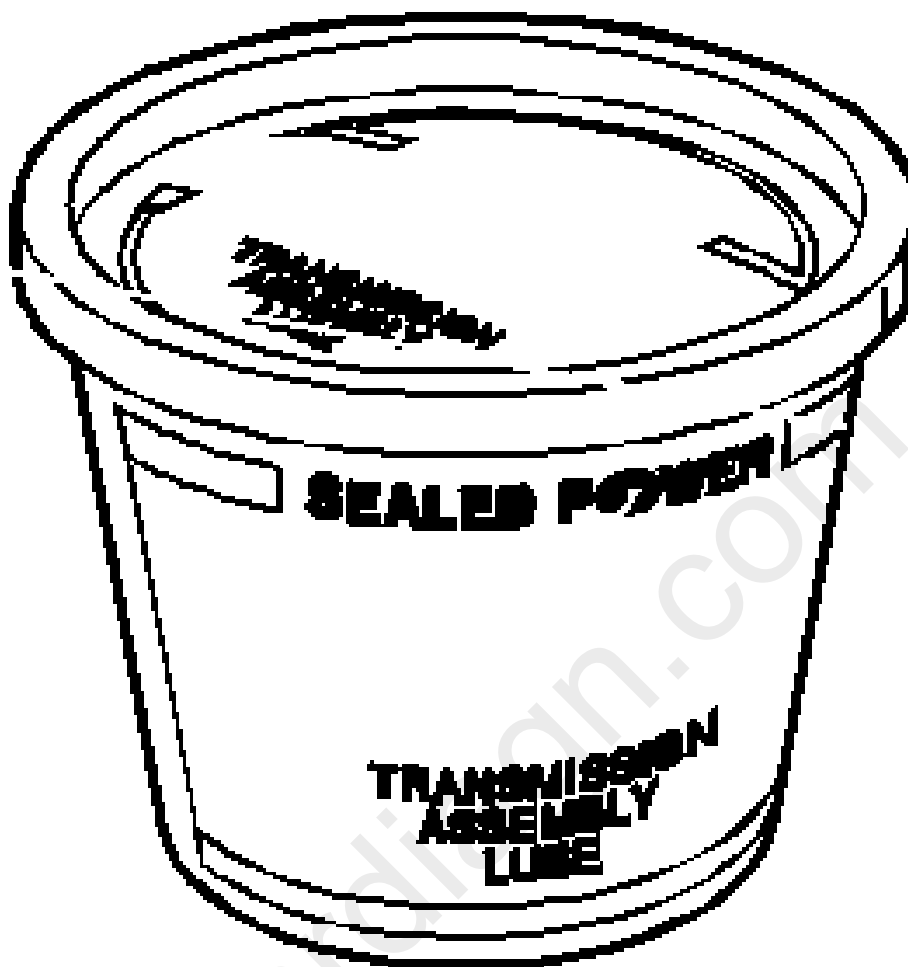
J-28431-6
Fluorescent Oil D,
6 1 oz



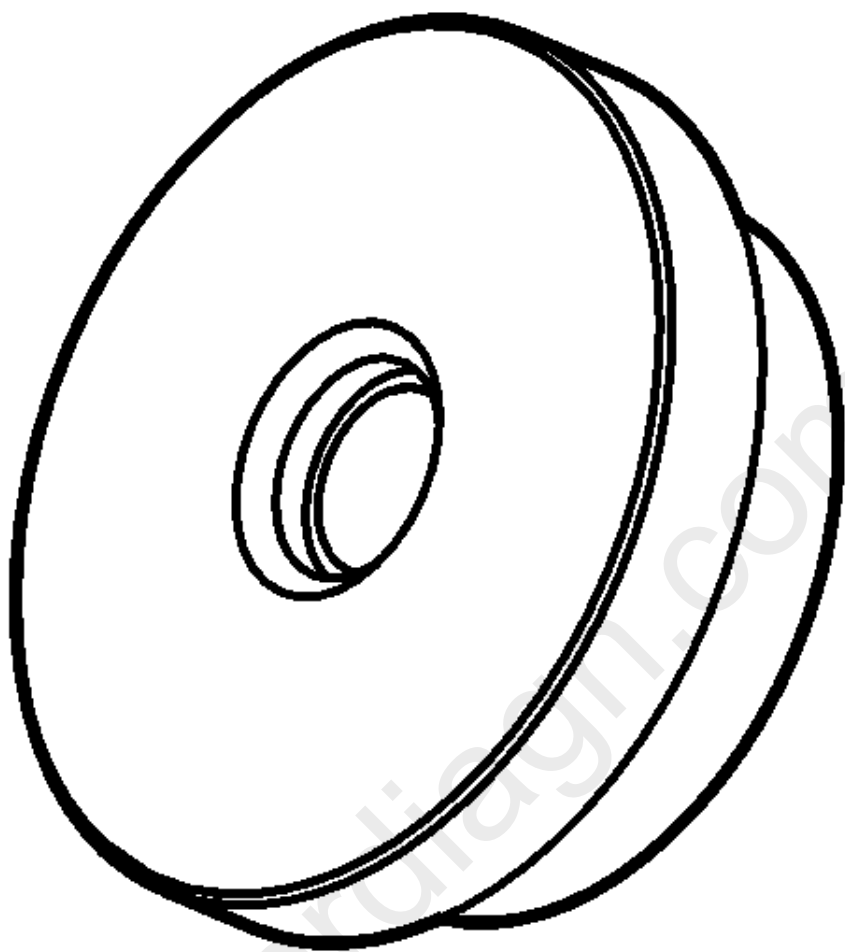
J-29369-2
Bushing and Bear
Remover - 2-3 i



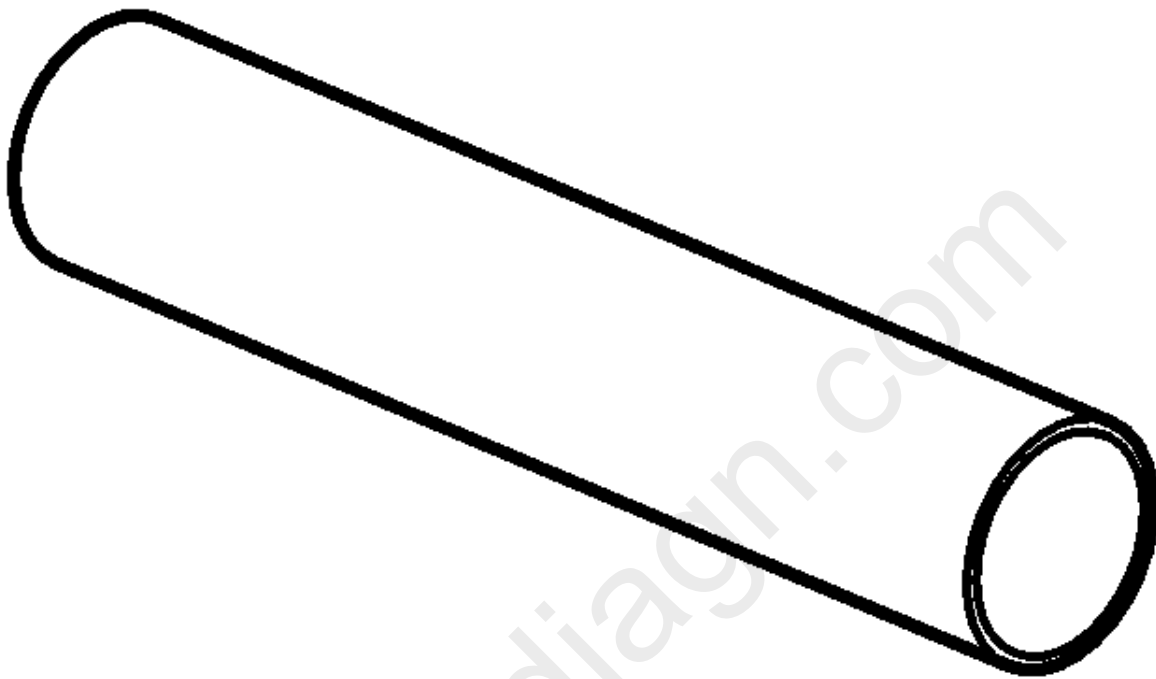
J-36842
Transaxle Holding
Fixture



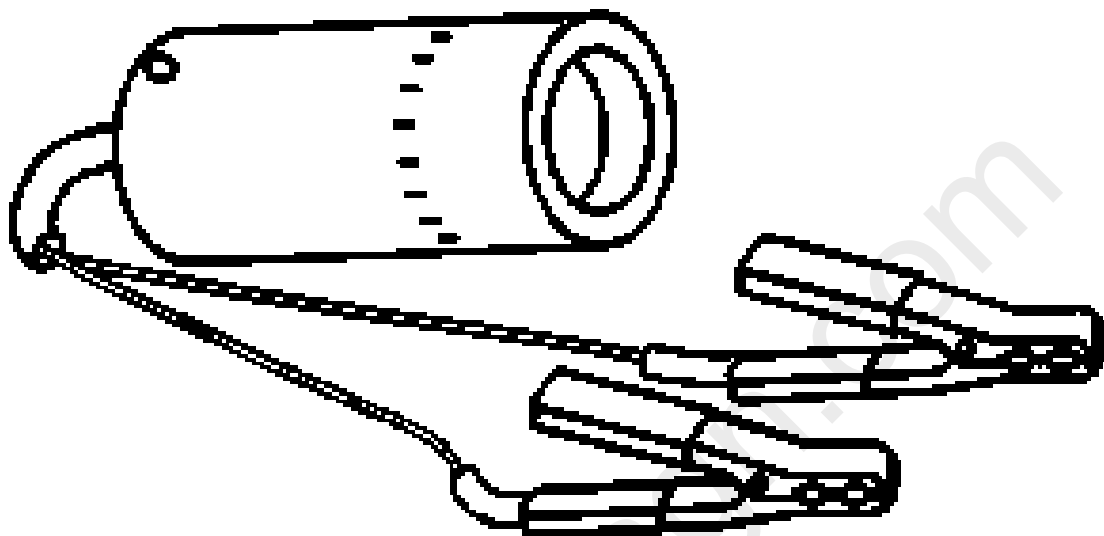
J-36850
Transjell Lubrica



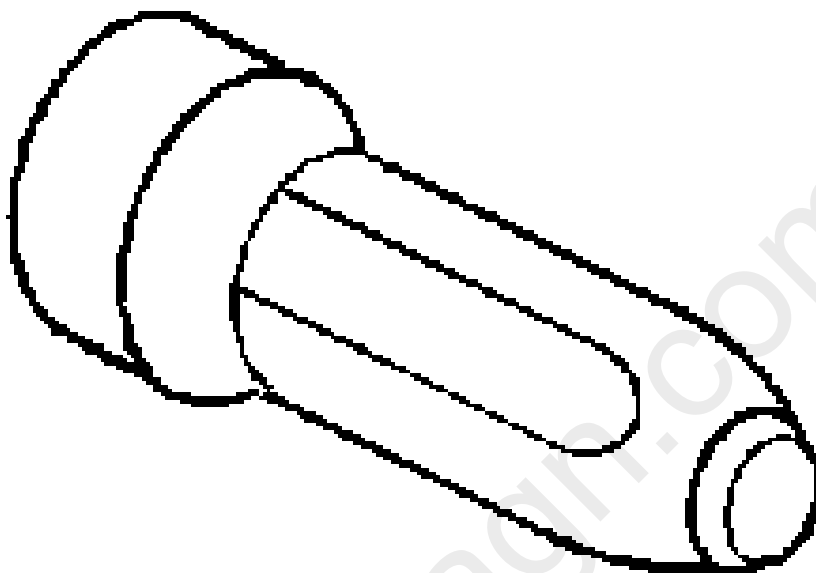
J-38412
Bearing Cup Insta



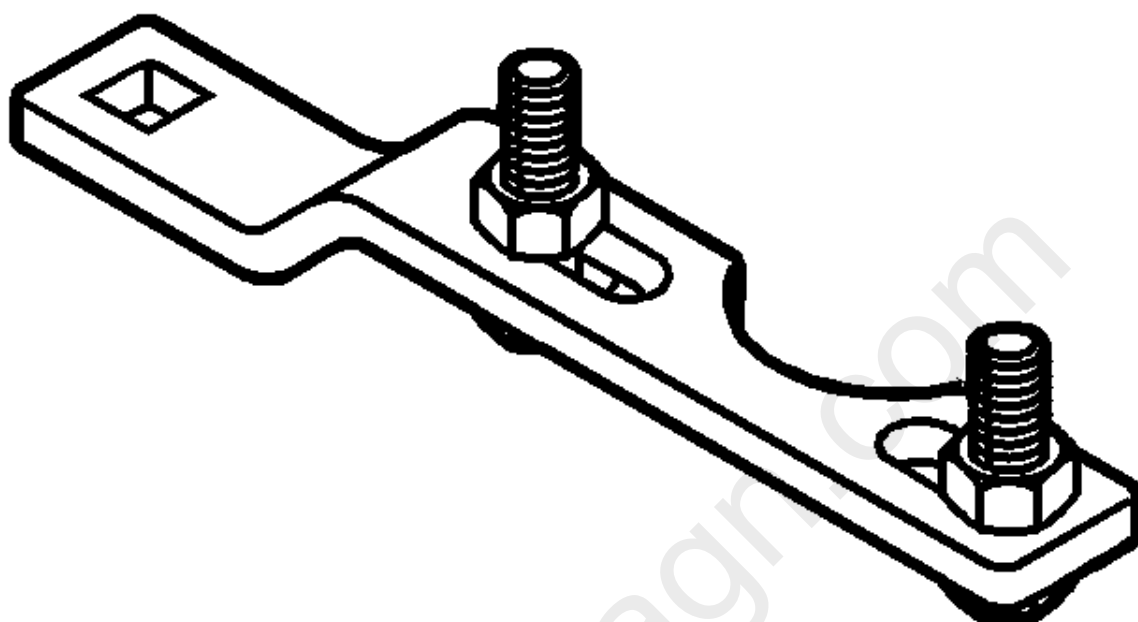
J-41736
Bearing Install



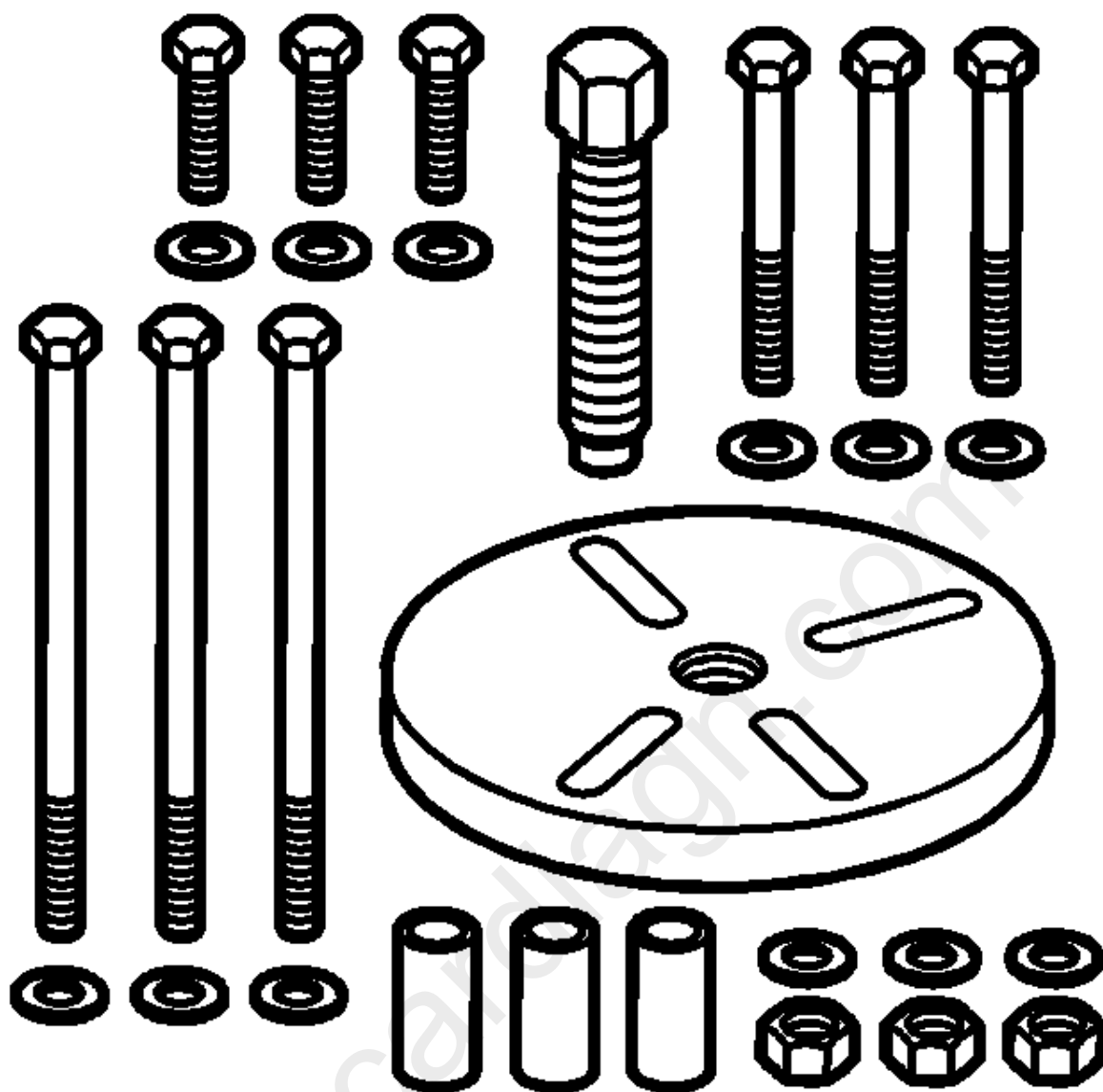
J-42220
Universal 12V LED
Detection Lamp



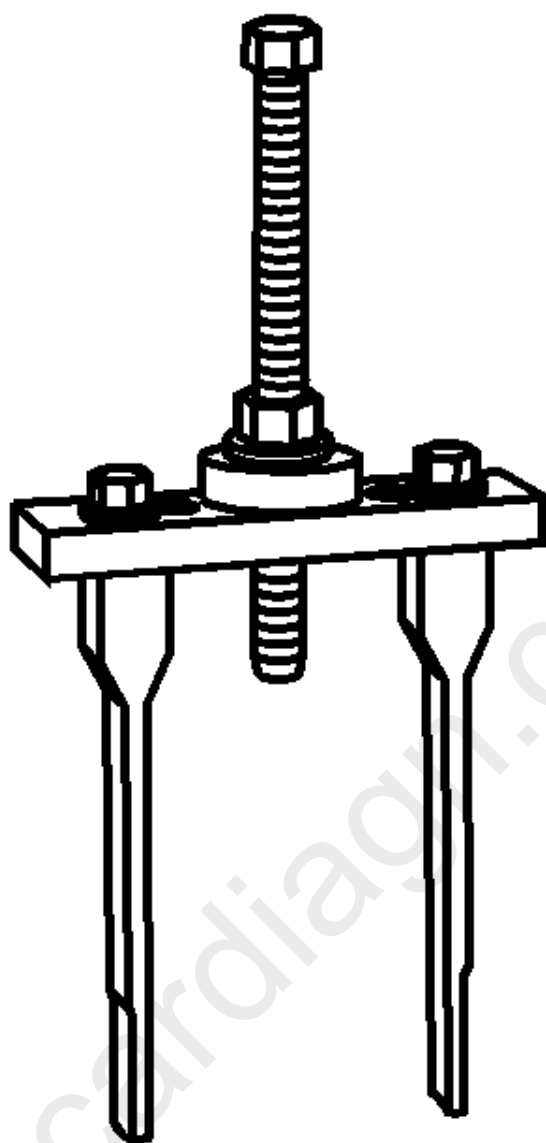
J-42738
Seal Installer



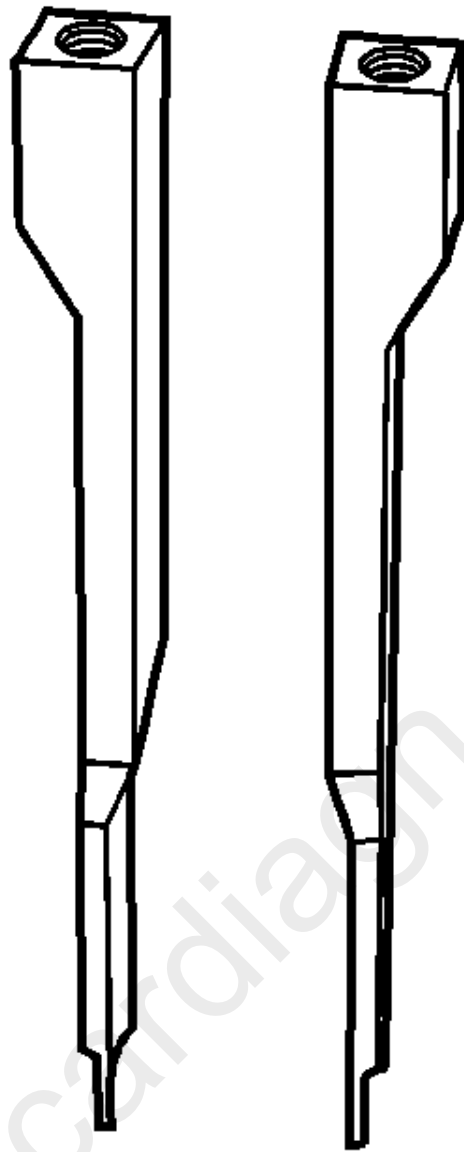
J-45012
Holding Fixture



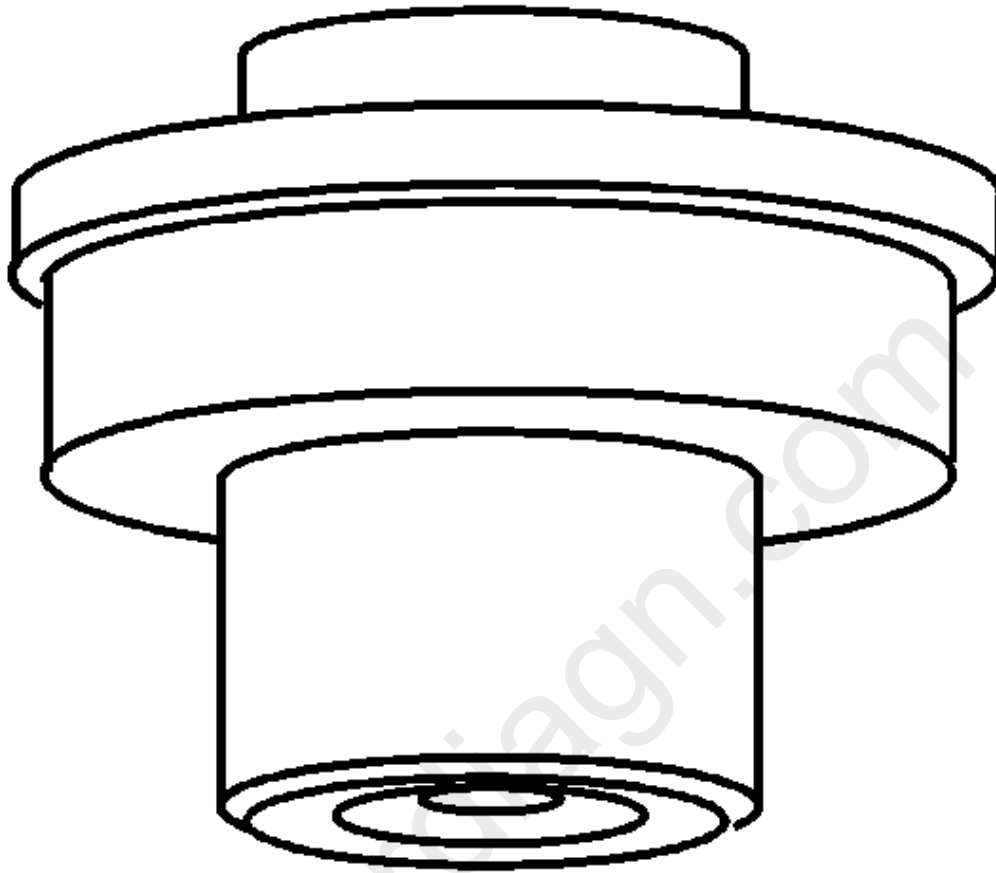
J-45019
Flange and Pinic
Cage Remover



J-45124
Removal Bridg



J-45124-9
Puller Leg



J-45853
Rear Axle Bearing
Seal Installer