

TRANSMISSION

Transfer Case - BW 4477 - Coupe & Wagon

SPECIFICATIONS

APPROXIMATE FLUID CAPACITIES

Approximate Fluid Capacities

Application	Specification	
	Metric	English
Mobil LT Fluid GM P/N 88861950 (Canadian P/N 88861951)	1 L	1.06 qt

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Propeller Shaft-to-Transfer Case Flange Bolt	30 N.m	22 lb ft
Sump Retainer Plate Bolt	7 N.m	62 lb in
Transfer Case Bolts	27-35 N.m	20-26 lb ft
Transfer Case Coil Nuts (Qty: 3)	8-11 N.m	71-97 lb in
Transfer Case Front Output Shaft Drive Chain Coast Side Snubber Bolts (Qty: 2)- Model Dependent	7 N.m	62 lb in
Transfer Case Front Output Shaft Drive Chain Snubber Bolts (Qty: 2)	7 N.m	62 lb in
Transfer Case Front Output Shaft Hole Plug	15-20 N.m	11-14 lb ft
Transfer Case Oil Drain Plug- Magnetic	19-30 N.m	14-22 lb ft
Transfer Case Oil Fill Plug	19-30 N.m	14-22 lb ft
Transfer Case Rear Output Shaft Flange Nut	305-332 N.m	225-245 lb ft
Transfer Case Temperature Sensor Assembly	20-25 N.m	14-18 lb ft
Transfer Case-to-Transmission Bolts	60 N.m	44 lb ft
Transfer Case Vibration Dampener Bolt	27-35 N.m	20-26 lb ft
Transmission Mount-to-Body Bolt	60 N.m	44 lb ft
Transmission Mount-to-Transmission Bolt	110 N.m	81 lb ft
Vent Baffle Bolt (Qty: 1)	7 N.m	62 lb in
Wire Retainer Bolt	10-13 N.m	88-115 lb in

SPACER AND SHIM SPECIFICATIONS

Spacer and Shim Specifications

	Specification	

Application	Metric	English	Stamp
Transfer Case Four Wheel Drive Clutch Shim	8.60-8.50 mm	0.339-0.335 in	52
	8.80-8.70 mm	0.346-0.343 in	53
	9.00-8.90 mm	0.354-0.350 in	54
	9.20-9.10 mm	0.362-0.358 in	55
	9.40-9.30 mm	0.370-0.366 in	56
	9.60-9.50 mm	0.378-0.374 in	57
	9.80-9.70 mm	0.386-0.382 in	58

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Adhesives, Fluids, Lubricants, and Sealers

Application	Type of Material	GM Part Number	
		United States	Canada
Transfer Case Fluid	Transfer Case Fluid	88861950	88861951
Transfer Case Front Output Shaft Drive Chain Snubber Bolts (Qty: 2)	Threadlocker	12345382	10953489
Transfer Case Input Shaft Inside Diameter (ID)	Lubricant	1051344	993037
Transfer Case Oil Drain Plug - Magnetic	Sealant	12346004	10953480
Transfer Case Oil Fill Plug	Sealant	12346004	10953480
Transfer Case Rear Case Half-to-Front Case Half	Sealant	12346141	89022195
Transfer Case Vent Baffle Bolt (Qty: 1)	Threadlocker	12345382	10953489

SCHEMATIC WIRING DIAGRAMS

TRANSFER CASE CONTROL WIRING SCHEMATICS

All-Wheel Drive (MX7)

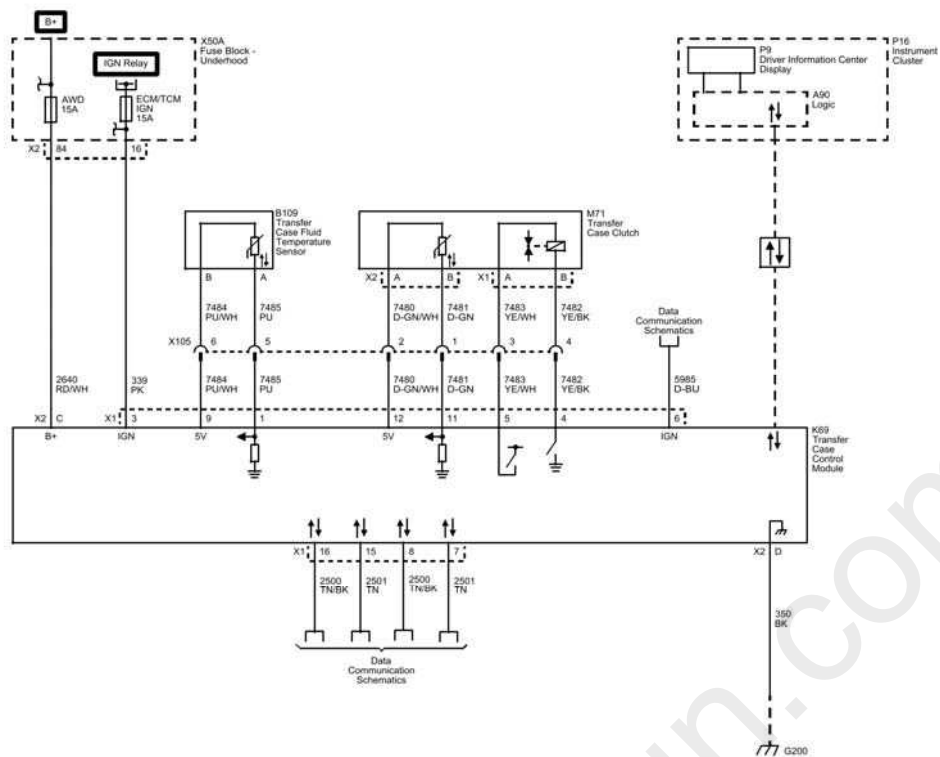


Fig. 1: All-Wheel Drive (MX7)
 Courtesy of GENERAL MOTORS COMPANY

COMPONENT LOCATOR

TRANSFER CASE DISASSEMBLED VIEW

Case Components

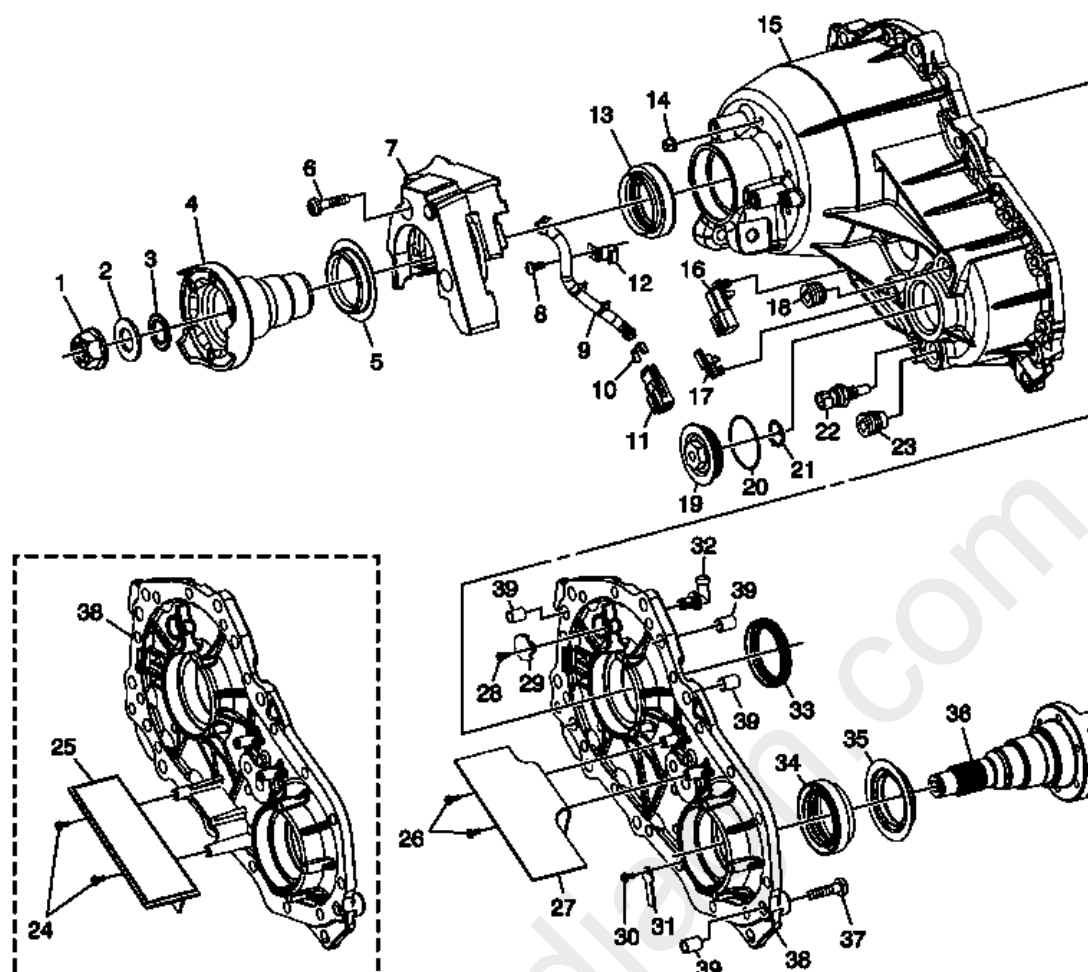


Fig. 2: Transfer Case Components
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transfer Case Rear Output Shaft Flange Nut
2	Transfer Case Rear Output Shaft Thrust Washer
3	Transfer Case Rear Output Shaft Flange O-Ring Seal
4	Transfer Case Rear Output Shaft Flange Assembly
5	Transfer Case Rear Output Shaft Seal Dirt Deflector
6	Transfer Case Vibration Dampener Bolt
7	Transfer Case Vibration Dampener
8	Transfer Case J-Clip Bolt
9	Transfer Case Clutch Coil Harness Protector
10	Transfer Case Clip
11	Transfer Case Coil Connector Assembly
12	Transfer Case J-Clip
13	Transfer Case Rear Output Shaft Seal

14	Transfer Case Coil Nuts (Qty: 3)
15	Transfer Case - Rear Half
16	Transfer Case Clutch Resistor
17	Transfer Case Clip
18	Transfer Case Oil Fill Plug
19	Transfer Case Front Output Shaft Hole Plug
20	Transfer Case Front Output Shaft Hole Plug O-Ring Seal
21	Transfer Case Front Output Shaft Bearing Retaining Ring
22	Transfer Case Temperature Sensor Assembly
23	Transfer Case Oil Drain Plug - Magnetic
24	Transfer Case Front Output Shaft Drive Chain Coast Side Snubber Bolts (Qty: 2) - Model Dependent
25	Transfer Case Front Output Shaft Drive Chain Coast Side Snubber - Model Dependent
26	Transfer Case Front Output Shaft Drive Chain Snubber Bolts (Qty: 2)
27	Transfer Case Front Output Shaft Drive Chain Snubber
28	Transfer Case Vent Baffle Bolt
29	Transfer Case Vent Baffle
30	Transfer Case Oil Pump Suction Hose Bolt
31	Transfer Case Oil Pump Suction Hose Clamp
32	Transfer Case Vent Assembly
33	Transfer Case Front Input Shaft Seal
34	Transfer Case Output Shaft Seal
35	Transfer Case Front Output Shaft Seal Dirt Deflector
36	Transfer Case Front Output Shaft
37	Transfer Case Half Bolt
38	Transfer Case - Front Half - Model Dependent
39	Transfer Case Half Location Pin

Internal Components

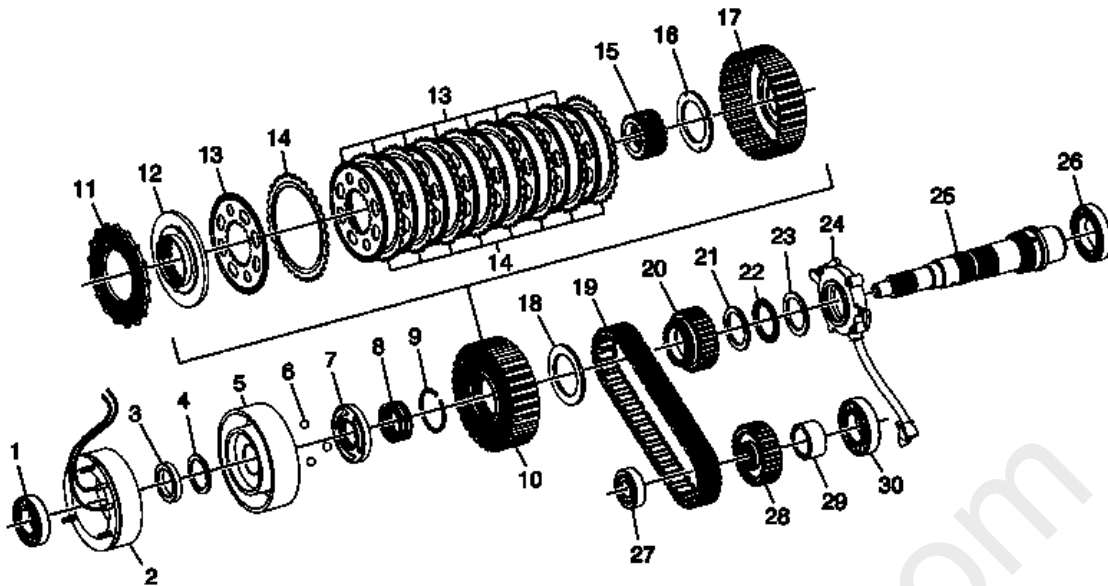


Fig. 3: View of Transfer Case Internal Components
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transfer Case Rear Output Shaft Rear Bearing Assembly
2	Transfer Case Coil Assembly
3	Transfer Case Shim
4	Transfer Case Thrust Bearing
5	Transfer Case Rotor Assembly
6	Transfer Case Balls
7	Transfer Case Apply Cam
8	Transfer Case Wave Spring
9	Transfer Case Retaining Ring
10	Transfer Case Clutch Pack Assembly, Plate Kit
11	Transfer Case Armature
12	Transfer Case Pressure Plate
13	Transfer Case Friction Plate
13	Transfer Case Friction Plate
14	Transfer Case Separator Plate
14	Transfer Case Separator Plate
15	Transfer Case Clutch Hub
16	Transfer Case Thrust Plate
17	Transfer Case Clutch Pack Housing

18	Transfer Case Front Output Shaft Drive Sprocket Spacer
19	Transfer Case Front Output Shaft Drive Chain Assembly
20	Transfer Case Front Output Shaft Drive Sprocket
21	Transfer Case Front Output Shaft Drive Sprocket Thrust Washer
22	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly
23	Transfer Case Front Output Shaft Drive Sprocket Thrust Washer
24	Transfer Case Oil Pump Assembly
25	Transfer Case Input Shaft Assembly
26	Transfer Case Input Shaft Bearing Assembly
27	Transfer Case Front Output Shaft Rear Bearing Assembly
28	Transfer Case Front Output Shaft Driven Sprocket
29	Transfer Case Front Output Shaft Driven Sprocket Spacer
30	Transfer Case Front Output Shaft Front Bearing Assembly

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC C0399</u>	DTC C0399 01 Clutch Coil Circuit Malfunction Short to Battery DTC C0399 02 Clutch Coil Circuit Malfunction Short to Ground DTC C0399 04 Clutch Coil Circuit Malfunction Open Circuit
<u>DTC C0400</u>	DTC C0400 Transfer Case Clutch Calibration Resistor Circuit
<u>DTC C0401</u>	DTC C0401 01 Transfer Case Oil Temperature Sensor Circuit Short to Battery DTC C0401 06 Transfer Case Oil Temperature Sensor Circuit Short to Ground or Open
<u>DTC C0550</u>	DTC C0550 36 Electronic Control Unit Malfunction EEPROM Failure
<u>DTC C0896</u>	DTC C0896 03 Device Voltage Range Voltage Below Threshold DTC C0896 07 Device Voltage Range Voltage Above Threshold

DTC C0399: CLUTCH COIL CIRCUIT MALFUNCTION

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

Clutch Coil Circuit Malfunction Short to Battery

DTC C0399 02

Clutch Coil Circuit Malfunction Short to Ground

DTC C0399 04

Clutch Coil Circuit Malfunction Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Battery	Signal Invalid
Clutch Coil Control	C0399 02	C0399 04	C0399 01	-
Clutch Coil Return	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 (TCCM) sends 12 volts to the transfer case clutch coil (TCCC) via the clutch coil control circuit. This engages the transfer case clutch assembly through a ball and cam apply system. The TCCC is controlled by a high and low side driver. Both circuits must be activated to engage the system.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is between 9 and 16 volts.

Conditions for Setting the DTC

The voltage seen by the transfer case control module is below 0.30 volts or above 0.70 volts for more than 5 seconds.

Action Taken When the DTC Sets

- The vehicle will be in 2WD mode while the fault is present.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

Conditions for Clearing the DTC

- The TCCM clears the DTC if the condition for setting the DTC is not currently present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- 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 10.5 volts as Special Functions will not work correctly if the system is below this voltage.
- The TCCM comes preprogrammed and is not flashable.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

Electrical Information Reference

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

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

J 35616 GM-Approved Terminal Test Kit

Circuit/System Testing

1. Ignition OFF, disconnect the X1 connector at the TCCM. Test terminals 4 and 5 X1, harness side, for proper pin retention using **J 35616-2A** probe. Refer to Connector Repairs . If both terminals test normal, reconnect the X1 connector at the TCCM.

NOTE: When test probing terminals, it is imperative to use the proper test probe from the most current version of the J 35616 test kit. Using the J 35616-35 probe will deform the terminals in the TCCC connector.

2. Disconnect the X1 connector at the TCCC. Test terminals A and B X1, harness side, for proper pin retention using J 35616-4A. Refer to **Connector Repairs**.
3. Ignition on. Using **J 35616-4A** probe, connect a DMM between the clutch coil control circuit, pin A X1 TCCC, harness side, and a good ground. Using the scan tool special functions, command the clutch control ON. The DMM should indicate battery voltage.
 - If the DMM indicates less than battery voltage, test the clutch coil control circuit for an open, high resistance or short to ground. If the circuit tests normal, replace the TCCM.

NOTE: **There will be a diagnostic voltage of 2-4 volts present at all times, this does not indicate a short to voltage.**

4. Using the scan tool special functions command the clutch control OFF. The DMM should indicate 2-4 volts.
 - If the DMM indicates greater than 2-4 volts when it is commanded OFF, test the clutch coil control circuit for a short to voltage. If the circuit tests normal, replace the TCCM.
5. Using **J 35616-4A** probe, connect a DMM between the clutch coil return circuit, pin B X1 TCCC harness side, and a good ground. Put the DMM on the audible selection for testing resistance. Using the scan tool special functions, command the clutch return circuit ON. The DMM should indicate continuity.
 - If the DMM did not indicate continuity, test the clutch coil return circuit for an open, high resistance or a short to voltage. If the circuit tests normal, replace the TCCM.
6. Using the scan tool special functions, command the clutch return circuit OFF. The DMM should NOT indicate continuity.
 - If the DMM indicates continuity, test the clutch coil return circuit for a short to ground. If the circuit tests normal, replace the TCCM.
7. Using **J 35616-5** probe, test for 2-5 ohms of resistance between TCCC, pins A and B X1 TCCC.
 - If the resistance is not within the specified range, replace the transfer case. Refer to **Transfer Case Assembly Replacement**.

Repair Instructions

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

- **Control Module References** for TCCM replacement, setup, and programming.
- **Transfer Case Assembly Replacement**

DTC C0400: TRANSFER CASE CLUTCH CALIBRATION RESISTOR 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 C0400

Transfer Case Clutch Calibration Resistor Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Transfer Case Clutch Calibration Resistor Circuit	C0400	C0400	C0400	C0400

Circuit/System Description

A transfer case will be equipped with one of nine different value transfer case resistors. The resistor value the unit is equipped with is dependent upon manufacturing tolerances and is a result of end of line testing at the manufacturer. A 5-volt reference is supplied to the resistor, and then it is read back via the clutch resistor signal circuit giving the module the voltage indicating what resistor value is present. Having the wrong resistor may cause the system to be less responsive to certain driving situations and also could damage the front axle. Depending on the resistor value used a customer may never know the system is not performing at optimum efficiency.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 9-16 volts.
- DTC C0896 is not set.

Conditions for Setting the DTC

The Clutch Resistor Value parameter on the scan tool falls within one of the 10 dead bands below.

Action Taken When the DTC Sets

- System performance may be affected.
- No DIC messages will be displayed.

Conditions for Clearing the DTC

- The transfer case shift 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.

IMPORTANT: Having an incorrect resistor value will not disable the AWD system and will likely not be noticed by the driver. However this fault should be addressed, as this will optimize system performance.

- This fault will likely not be noticed by the driver; however you can address this fault by looking at the clutch resistor value on the scan tool via the scan tool data list. The voltages should never be below 0.20 volts or above 4.60 volts.
- Check inline connector X103 for bent pins, corrosion, or other damage.
- Check for bent pins inside the resistor.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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

The clutch coil resistor can be checked by measuring the resistance of the resistor with a DMM by putting one lead on pin B and the other on pin A, the correct resistance is embossed in the resistor. If the system is operating normally you should see a voltage range of 0.20-4.60 volts on the clutch resistor value via the scan tool data list. The value for the 5-volt reference circuit should be 4.8-5.0 volts. Further explanation is given in component testing. Should you see a voltage out of range you should check the 5-volt reference circuit and the signal circuit for an open, high resistance, short to voltage, or short to ground.

- See component testing for further direction.

Component Testing

Clutch Resistor values can vary up to 3 percent and not set a DTC. Resistor values falling within the dead band area will set this DTC.

Clutch resistors vary depending on clutch stack up during manufacture. View the clutch resistor values on the scan tool this will allow you to properly diagnose the circuit. A system operating within the suggested voltage range will be operating as designed.

Clutch Style

Clutch Style	Ohms	Suggested Voltage	GM Part Number
Clutch Style 1	0.115k ohms	4.4-4.6 volts	19206436
Clutch Style 2	0.255k ohms	3.9-4.1 volts	19206437
Clutch Style 3	0.453k ohms	3.3-3.5 volts	19206438
Clutch Style 4	0.715k ohms	2.8-3.0 volts	19206439
Clutch Style 5	1.15k ohms	2.2-2.4 volts	19206440
Clutch Style 6	1.82k ohms	1.7-1.9 volts	19206441
Clutch Style 7	3.16k ohms	1.1-1.3 volts	19206442
Clutch Style 8	7.32k ohms	0.56-0.70 volts	19206443
Clutch Style 9	12.70k ohms	0.20-0.39 volts	19206444

Dead Bands

Dead Bands	Volts
Dead Band 1	>4.6 volts
Dead Band 2	>4.1-<4.4 volts
Dead Band 3	>3.5-<3.9 volts
Dead Band 4	>3-<3.3 volts
Dead Band 5	>2.4-<2.8 volts
Dead Band 6	>1.9-<2.2 volts
Dead Band 7	>1.3-<1.7 volts
Dead Band 8	>0.7-<1.1 volts
Dead Band 9	>0.39-<0.56 volts
Dead Band 10	<0.20 volts

Repair Instructions

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

Control Module References for TCSCM replacement, setup, and programming

DTC C0401: TRANSFER CASE OIL 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 01

Transfer Case Oil Temperature Sensor Circuit Short to Battery

DTC C0401 06

Transfer Case Oil Temperature Sensor Circuit Short to Ground or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Transfer Case Oil Temperature Sensor Circuit	C0401 06	C0401 06	C0401 01	-

Circuit/System Description

The temperature sensor is a variable resistor, as the temperature increases the resistance decreases and as the temperature decreases the resistance increases.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 9-16 volts.

Conditions for Setting the DTC

- DTC C0896 is not set.
- System voltage is above 9 volts and below 16 volts.
- For a short to voltage or actual transfer case overheat condition, the DTC will set immediately once 154° C (309°F) has been met or exceeded.
- The vehicle has been driven 10 minutes at 73 km/h (45 mph) or higher for an open or short to ground condition.

Action Taken When the DTC Sets

- System backup will read the transmission oil temperature.
- The SERVICE 4WD indicator is set.

- If the transfer case oil temperature DTC is set due to an actual overheat condition and not an electrical fault then the AWD off indicator will be set.

Conditions for Clearing the DTC

- The transfer case shift 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.
- If the transfer case oil temperature sensor circuits are open or have high resistance the scan tool will indicate -40°C.
- Check inline connector X103 for bent pins, corrosion, or other damage.
- Check the transfer case temperature sensor for possible bent pins.
- If the transfer case oil temperature circuits are shorted to voltage the scan tool will read 154°C.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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. With the key off disconnect the transfer case oil temperature sensor at the transfer case.
2. Turn the ignition on and test pin B at the transfer case for voltage using a DMM the voltage reading should be 4.8 to 5.2 volts. If the voltage is out of range check the 5 volt reference circuit for a short to ground, open, high resistance, or short to battery. This can be done by using a DMM and testing from pin B at the transfer case and X1 pin 9 at the transfer case shift control module.
3. If the 5 volt reference circuit measured within specifications then using a fused jumper, jump pin B to pin A at the transfer case. With these two pins jumped read the transfer case oil temperature on the scan tool under transfer case data display. If the temperature reads 154°C then the circuit is testing good. If it does not show this temperature then repair the temperature sensor signal circuit for an open, high resistance, short to ground, or short to voltage. This can be done by using a DMM and testing from pin B at the transfer case and X1 pin 1 at the transfer case shift control module. If the temperature checks good replace the transfer case temperature sensor. If voltage on the 5 volt reference is out of range or the temperature is not indicating correctly go to the next step.
4. If both the 5 volt reference circuit and the temperature sensor signal circuit test good and the voltage or temperature are indicated out of range in the above two steps then replace the transfer case shift control module.

Repair Instructions

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

- **Control Module References** for TCSCM replacement, setup, and programming
- **Transfer Case Fluid Temperature Sensor Replacement**

DTC C0550: ELECTRONIC CONTROL UNIT MALFUNCTION EEPROM FAILURE

Diagnostic Instructions

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

DTC Descriptor

DTC C0550 36

Electronic Control Unit Malfunction EEPROM Failure

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	EEPROM Failure	Internal Electronic Failure
Electronic Control Unit	-	-	C0550 36	-

Malfunction				
-------------	--	--	--	--

Circuit/System Description

This DTC indicates an EEPROM failure where diagnostic data is stored.

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 9-16 volts.

Conditions for Setting the DTC

The EEPROM has failed and diagnostic data as well as other assorted data can not be stored.

Action Taken When the DTC Sets

- Activation is still disabled until the conditions for setting the DTC are no longer present.
- The SERVICE AWD indicator remains illuminated for the remainder of the current ignition cycle.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC if the 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.
- It is sometimes possible to set this DTC falsely due to low voltage. Attempt to clear this DTC and retest.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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

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

- If the DTC is cleared, but then resets then replace the transfer case control module.

Repair Instructions

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

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

DTC C0896: DEVICE VOLTAGE RANGE

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 C0896 03

Device Voltage Range Voltage Below Threshold

DTC C0896 07

Device Voltage Range Voltage Above Threshold

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Voltage Below Threshold	Voltage Above Threshold

Device Voltage Range	-	C0896 03	C0896 03	C0896 07
----------------------	---	----------	----------	----------

Circuit/System Description

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

Conditions for Running the DTC

- The ignition is ON.
- System voltage is 7-18.5 volts.

Conditions for Setting the DTC

The voltage is above 16 volts or below 9 volts for 4 seconds.

Action Taken When the DTC Sets

- Shifting is disabled until the voltages change to be within the specifications.
- The SERVICE AWD will not be illuminated.
- If the voltage drops below 7 volts the transfer case shift control module will go offline and a Service AWD indicator would then be present because the transfer case shift control module would no longer be transmitting on the Serial Data Line.

Conditions for Clearing the DTC

- The transfer case shift 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 voltage issue.

Reference Information

Schematic Reference

Transfer Case Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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 voltage is low check the voltage on other vehicle systems to determine if this is a vehicle wide condition and take appropriate actions. If this is transfer case specific check the ignition 3 feed to the transfer case control module and the ground for the transfer case control module for proper connections. The scan tool under transfer case data list can also be used to monitor battery voltage.
2. If the voltage is high, this is likely a vehicle issue such as an alternator problem or the vehicle has been hooked up improperly during a jump start.

Repair Instructions

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

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

Transfer Case Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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

Transfer Case Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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

Transfer Case Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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 internal transfer case component that causes a popping noise in the transfer case. Review the <u>Symptoms - Transfer Case</u> and perform the necessary inspections.	
Chain jump	• Replace the chain, sprockets, and snubber. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>. • Replace the shaft bearings. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>. • Inspect for damaged components caused by metal debris. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>.

TRANSFER CASE WHINE OR RUMBLE NOISE

Transfer Case Whine or Rumble Noise

Cause	Correction
DEFINITION: A faulty internal transfer case component that causes a whine noise in the transfer case. Review the <u>Symptoms - Transfer Case</u> and perform the necessary inspections.	
Faulty bearings	1. Inspect all of the bearings and journals. Refer to <u>Transfer Case Cleaning and Inspection</u>. 2. Replace any faulty bearings, and any components with faulty bearing journals. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>.
Worn or loose chain	1. Inspect for a loose chain, excessive wear on the snubber or deep gouges in the lining. 2. Replace the chain, sprockets and snubber. 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 in the transfer case. Review the <u>Symptoms - Transfer Case</u> and perform the necessary inspections.	
Incorrect fluid level or incorrect fluid	1. Inspect the transfer case for the correct fluid level. Refer to <u>Transfer Case Fluid Replacement</u>. 2. Inspect the transfer case for the correct type of fluid. 3. Flush the transfer case, and fill with the correct fluid, if required. Refer to <u>Approximate Fluid Capacities</u>.
Worn or loose chain	1. Inspect for a loose chain, excessive wear on the snubber or deep gouges in the lining. 2. Replace the chain, sprockets, and snubber. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>.

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 <u>Symptoms - Transfer Case</u> 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 <u>Special Tools</u> .	
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.

Drain plug or fill plug leak	1. Inspect for the correct sealer and the correct amount of sealer on the plugs. 2. Install the plugs correctly. Refer to <u>Transfer Case Fluid Replacement</u>.
Input/output or front output seal leaking	1. Inspect for the following conditions: • Overfilled or improper transfer case fluid • Blocked vent • Seal improperly installed, worn, or damaged • Seal bore damaged or cracked 2. Repair or replace the following components if found faulty: • Adjust or replace the transfer case fluid. Refer to <u>Transfer Case Fluid Replacement</u>. • Replace the case half, or case halves, if the seal bores are damaged. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>. • Replace the input/output shaft seal. Refer to <u>Transfer Case Disassemble</u>, and <u>Transfer Case Assemble</u>.
Leaking at the vent	• Leaking vent or input seal will be noticed from a weep hole between the adapter and the transfer case. • Transfer case overfilled Inspect for the correct transfer case fluid level. Refer to <u>Transfer Case Fluid Replacement</u>. • Damaged O-ring on the vent • Transmission output shaft seal leak will be noticed from a weep hole between the adapter and the transfer case.
Case half seam leak	Disassemble and seal the case halves. Refer to <u>Transfer Case Disassemble</u> , and <u>Transfer Case Assemble</u> .
Case leaking	1. Inspect for a cracked case or case porosity. 2. Replace the faulty case half. Refer to <u>Transfer Case</u>

REPAIR INSTRUCTIONS - ON VEHICLE

TRANSFER CASE FLUID REPLACEMENT

Special Tools

DT-48371 Plug Wrench

Removal Procedure

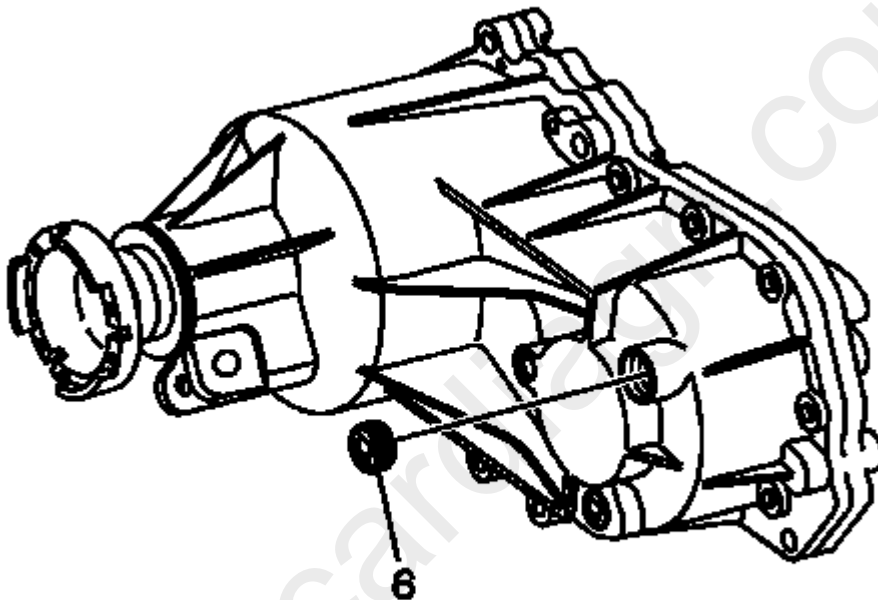


Fig. 4: View Of Fill Plug

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 (6) using the **DT-48371** plug wrench.

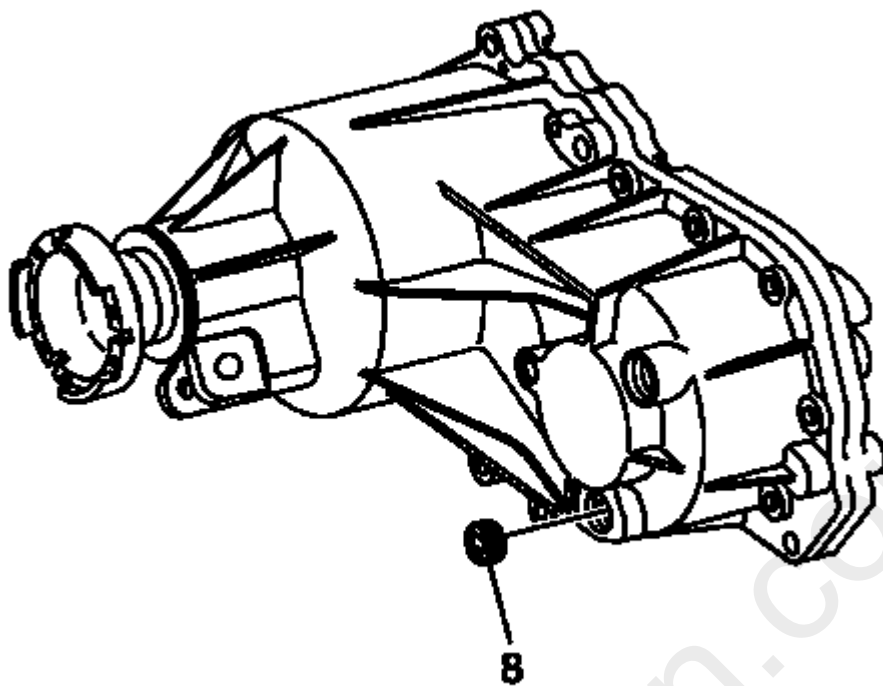


Fig. 5: View Of Drain Plug

Courtesy of GENERAL MOTORS COMPANY

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

4. Remove the drain plug (8).
5. Allow the transfer case to drain completely.

Installation Procedure

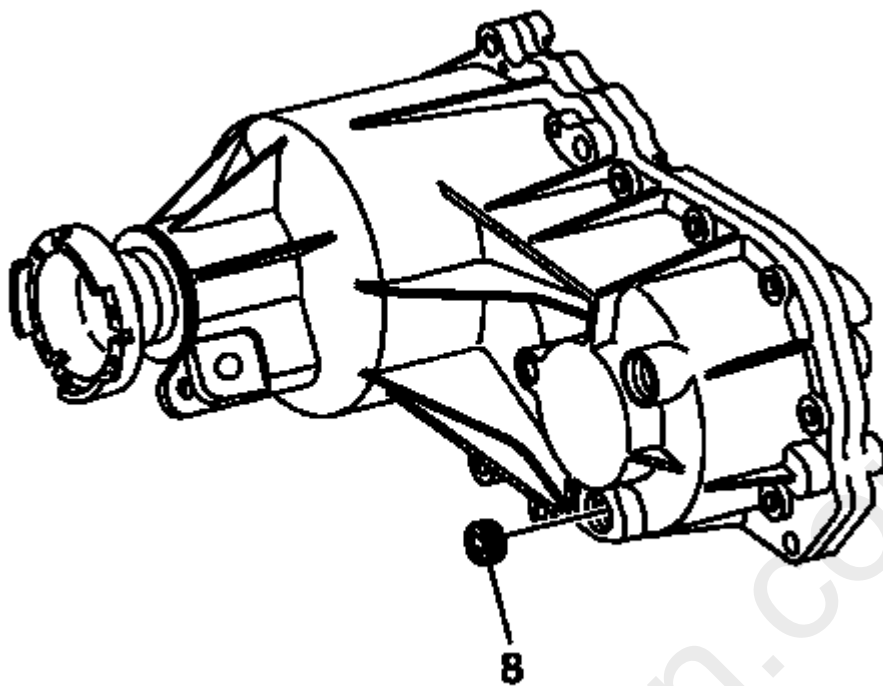


Fig. 6: View Of Drain Plug

Courtesy of GENERAL MOTORS COMPANY

1. Apply sealant GM P/N 12378470, (Canadian P/N 10952622), or equivalent to the threads of the drain plug.

CAUTION: Refer to Component Fastener Tightening Caution .

2. Install the drain plug (8) and tighten to 25 (18 lb ft).

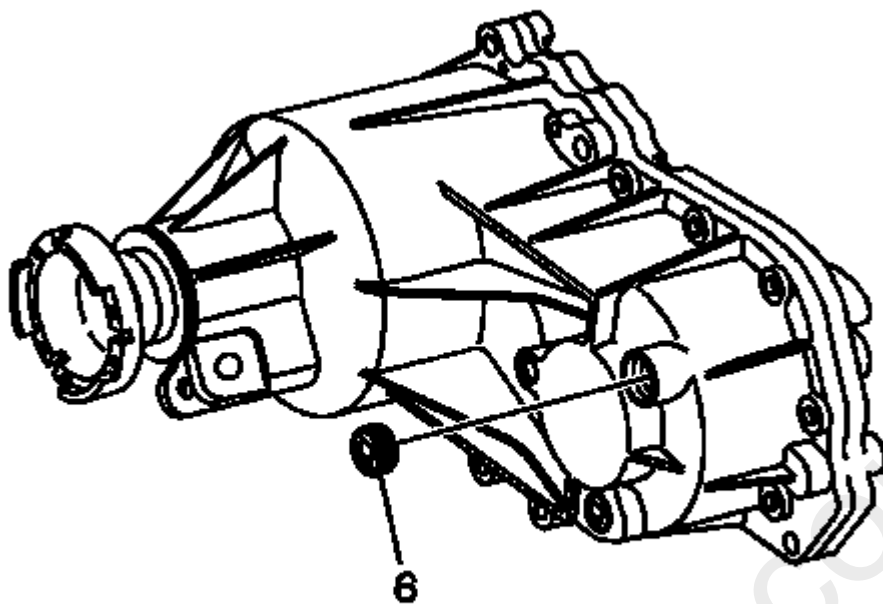


Fig. 7: View Of Fill Plug

Courtesy of GENERAL MOTORS COMPANY

3. Fill the transfer case to the bottom of the fill plug hole with Mobil LT fluid GM P/N 88861950, (Canadian P/N 88861951).
4. Install the fill plug (6) and tighten with hand plus 1.25 turns using the **DT-48371** plug wrench.
5. Lower the vehicle.

DRAIN PLUG REPLACEMENT

Special Tools

DT-48371 Plug Wrench

Removal Procedure

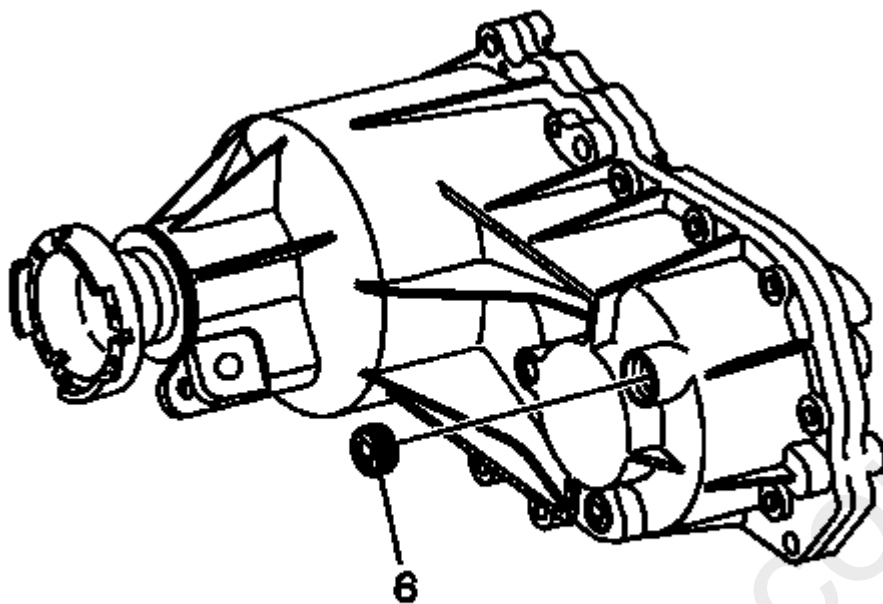


Fig. 8: View Of Fill Plug

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 (6) using the **DT-48371** plug wrench.

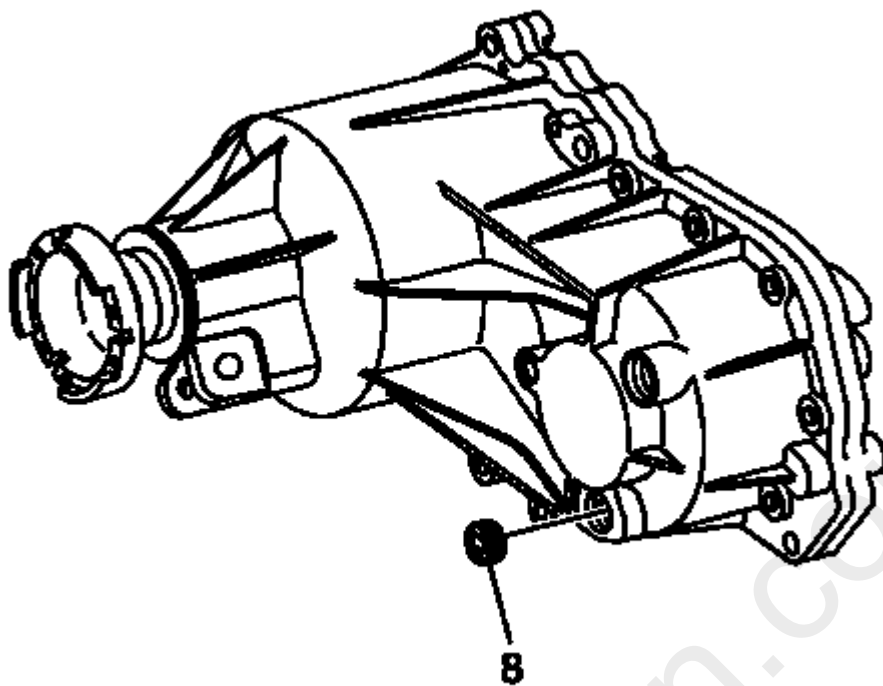


Fig. 9: View Of Drain Plug

Courtesy of GENERAL MOTORS COMPANY

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

4. Remove the drain plug (8).
5. Allow the transfer case to drain completely.

Installation Procedure

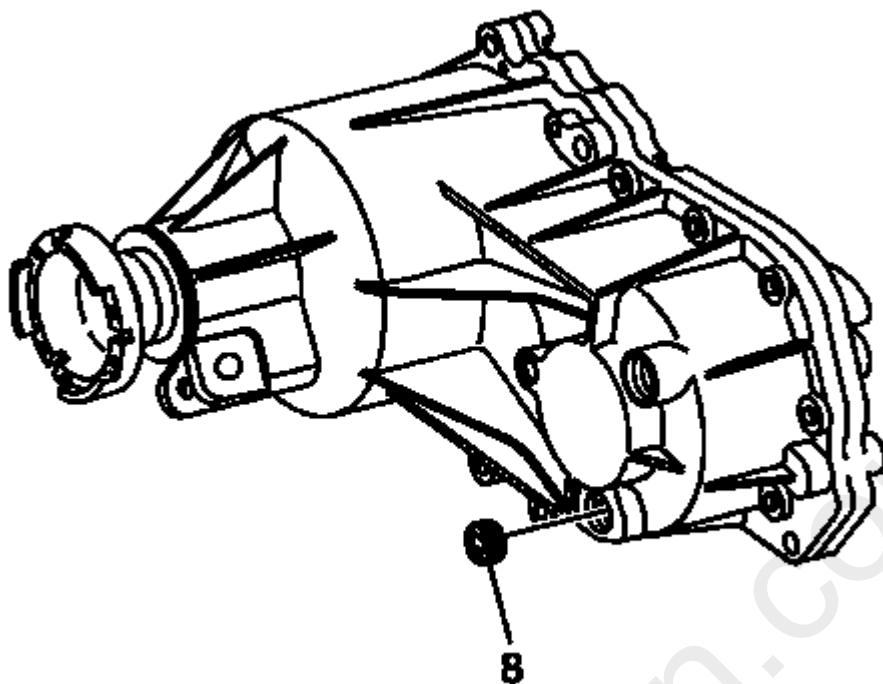


Fig. 10: View Of Drain Plug

Courtesy of GENERAL MOTORS COMPANY

1. Apply sealant GM P/N 12378470, (Canadian P/N 10952622), or equivalent to the threads of the drain plug.

CAUTION: Refer to Component Fastener Tightening Caution .

2. Install the drain plug (8) and tighten to 25 (18 lb ft).

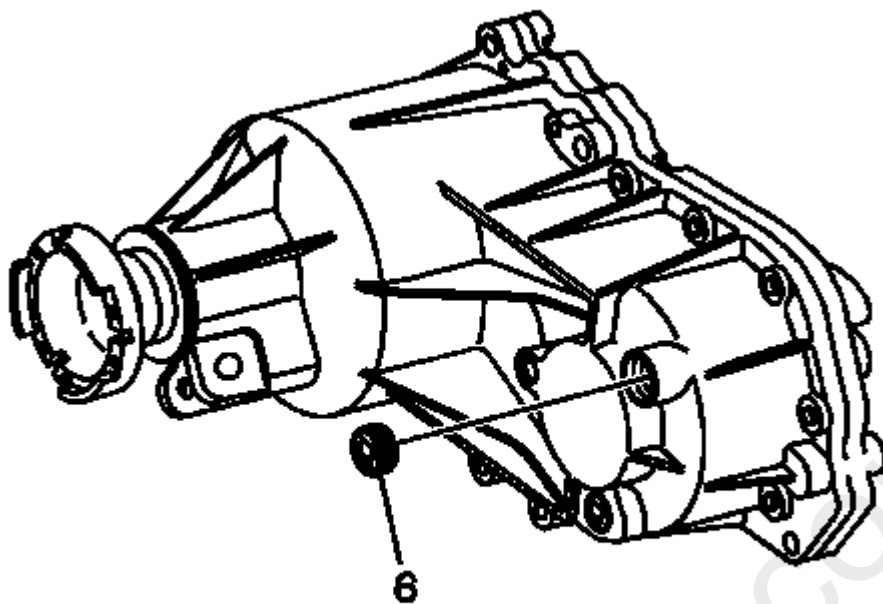


Fig. 11: View Of Fill Plug

Courtesy of GENERAL MOTORS COMPANY

3. Fill the transfer case to the bottom of the fill plug hole with Mobil LT fluid GM P/N 88861950, (Canadian P/N 88861951).
4. Install the fill plug (6) and tighten with hand plus 1.25 turns using the **DT-48371** plug wrench.
5. Lower the vehicle.

FILL PLUG REPLACEMENT

Special Tools

DT-48371 Plug Wrench

Removal Procedure

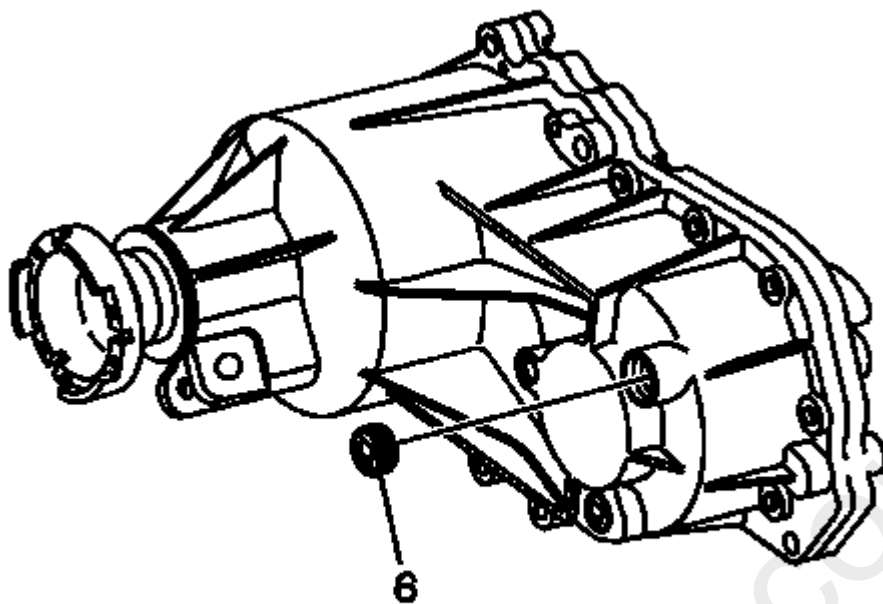


Fig. 12: View Of Fill Plug

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 (6) using the **DT-48371** plug wrench.

Installation Procedure

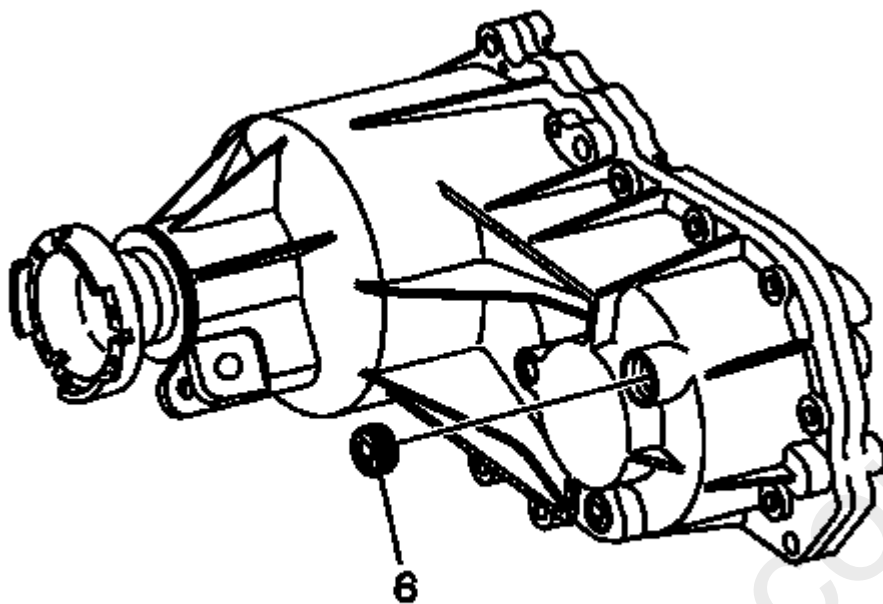


Fig. 13: View Of Fill Plug

Courtesy of GENERAL MOTORS COMPANY

1. Install the fill plug (6) and tighten with hand plus 1.25 turns using the **DT-48371** plug wrench.
2. Lower the vehicle.

TRANSFER CASE FLUID TEMPERATURE SENSOR REPLACEMENT

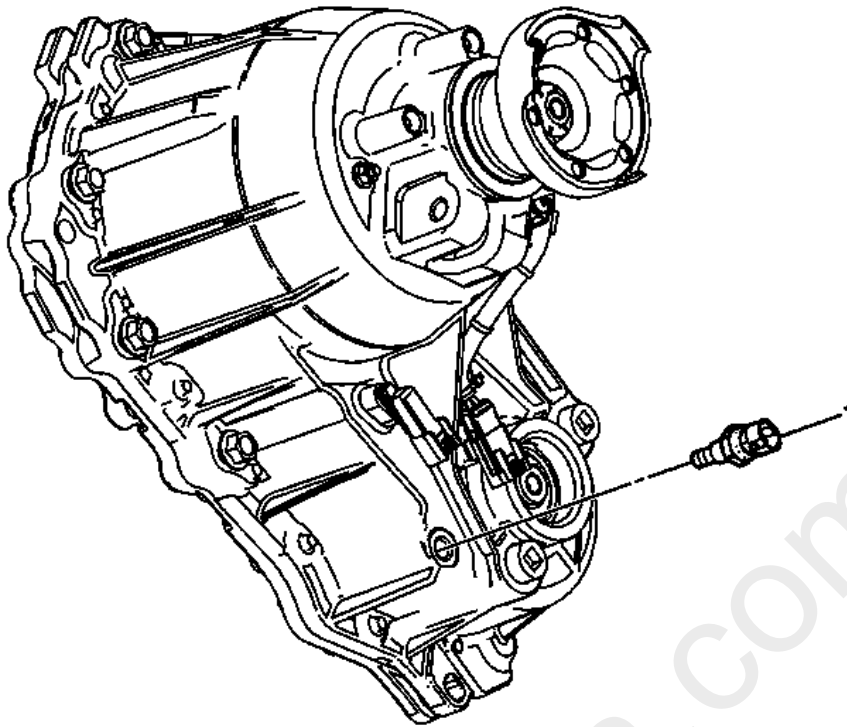


Fig. 14: Identifying Transfer Case Fluid Temperature Sensor
 Courtesy of GENERAL MOTORS COMPANY

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 N.m (16 lb ft)

TRANSFER CASE CLUTCH COIL RESISTOR REPLACEMENT

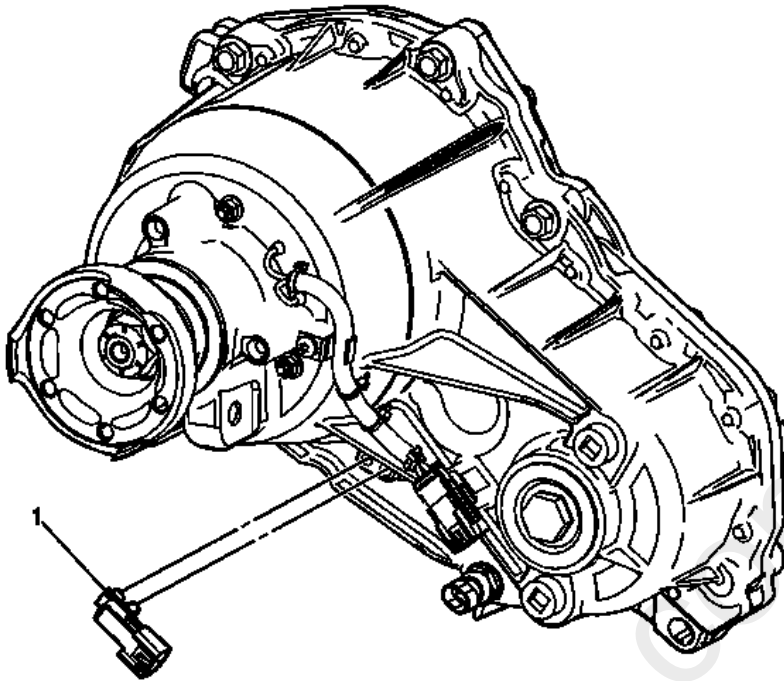


Fig. 15: Identifying Transfer Case Clutch Coil Resistor
 Courtesy of GENERAL MOTORS COMPANY

Transfer Case Clutch Coil Resistor Replacement

Callout	Component Name
Preliminary Procedure	
Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
1	Transfer Case Clutch Coil Resistor
Procedure	
Disconnect the electrical connector from the transfer case clutch coil resistor.	

TRANSFER CASE SHIFT CONTROL MODULE REPLACEMENT

Removal Procedure

1. Remove the right side instrument panel insulator. Refer to Instrument Panel Insulator Replacement - Right Side (Right Hand Drive) , Instrument Panel Insulator Replacement - Right Side (Left Hand Drive) .

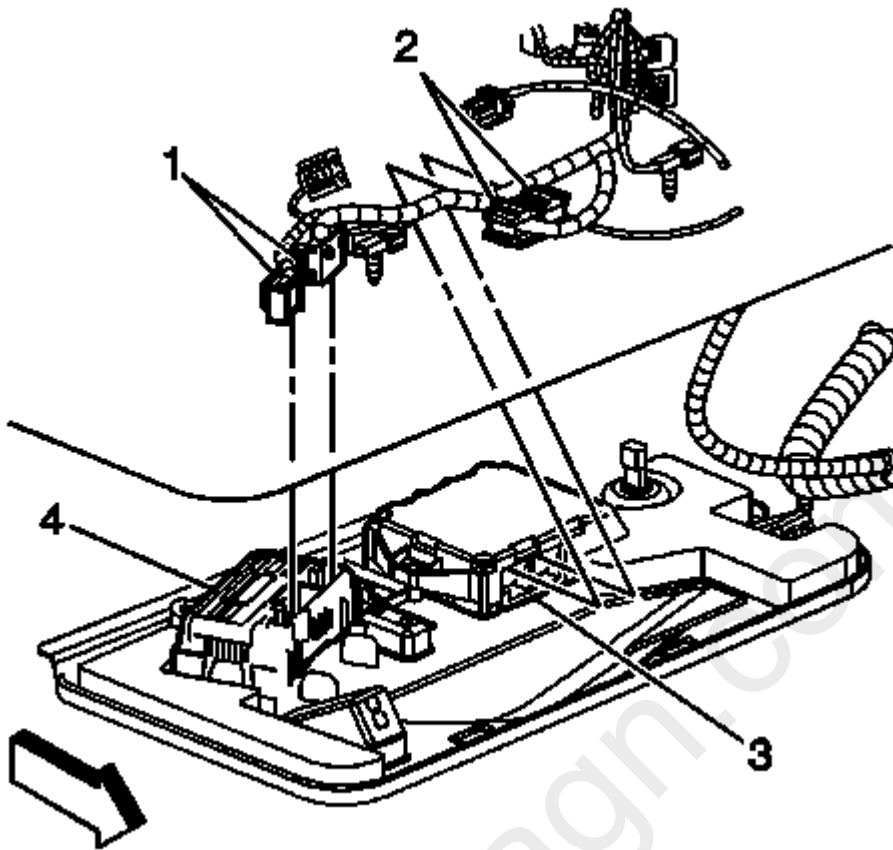


Fig. 16: View of Electrical Connectors
Courtesy of GENERAL MOTORS COMPANY

2. Remove the electrical connectors (1) from the transfer case shift control module (4).

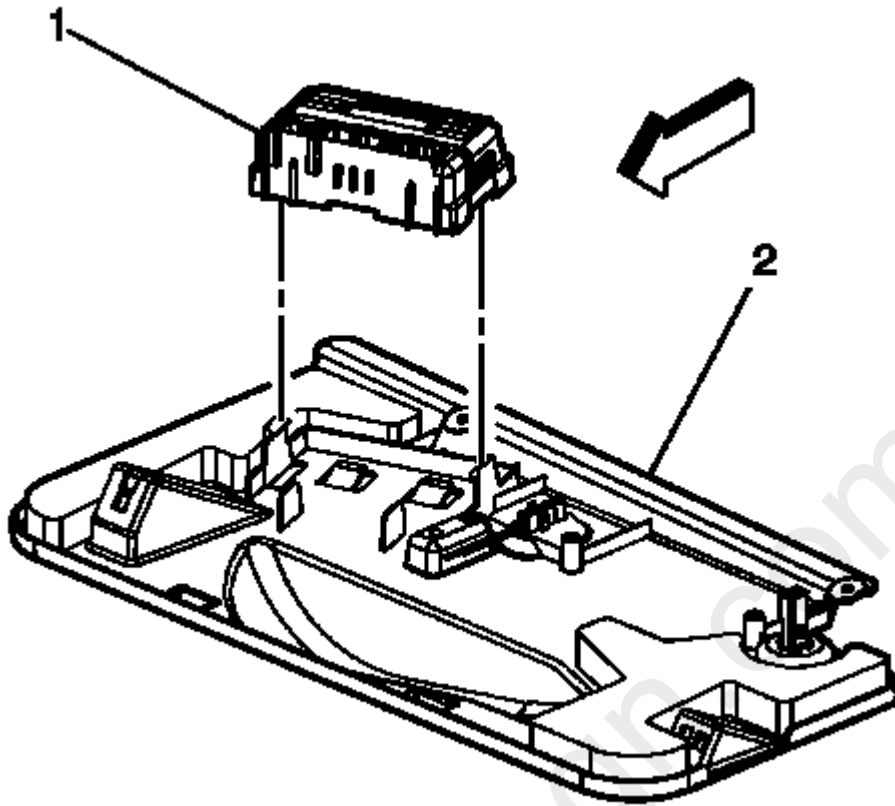


Fig. 17: View of Shift Control Module and Instrument Panel Insulator
Courtesy of GENERAL MOTORS COMPANY

3. Remove the transfer case shift control module (1) from the instrument panel insulator (2).

Installation Procedure

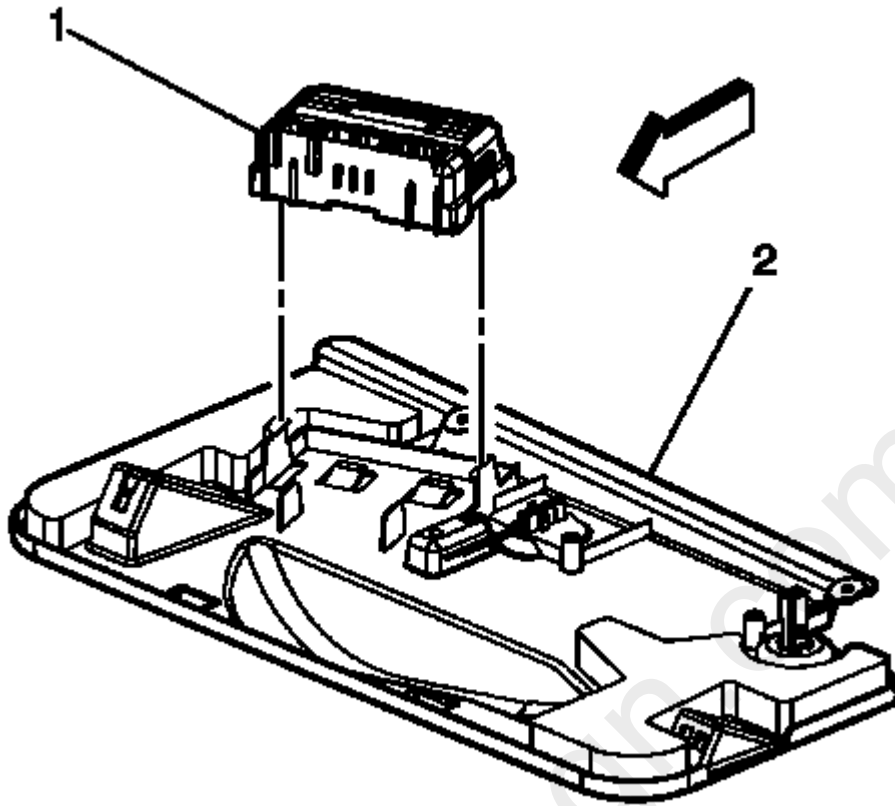


Fig. 18: View of Shift Control Module and Instrument Panel Insulator
Courtesy of GENERAL MOTORS COMPANY

1. Install the transfer case shift control module (1) to the instrument panel insulator (2).

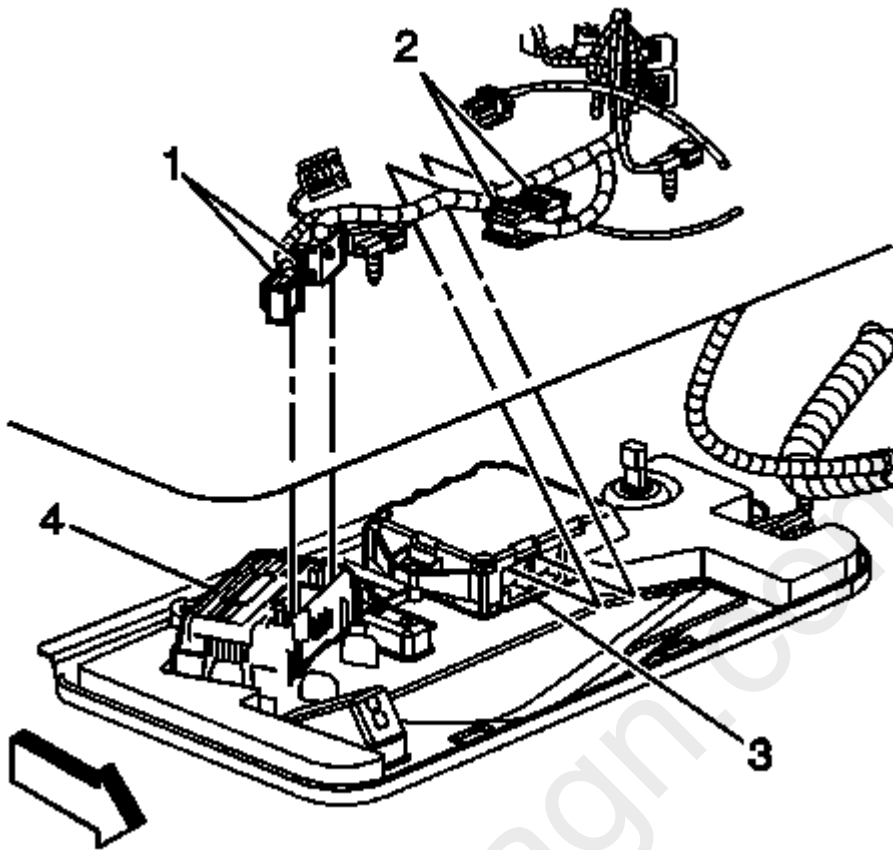


Fig. 19: View of Electrical Connectors
 Courtesy of GENERAL MOTORS COMPANY

2. Install the electrical connectors (1) to the transfer case shift control module (4).
3. Install the right side instrument panel insulator. Refer to **Instrument Panel Insulator Replacement - Right Side (Right Hand Drive)** , **Instrument Panel Insulator Replacement - Right Side (Left Hand Drive)** .
4. For module programming and setup information, refer to **Control Module References** .

TRANSFER CASE ASSEMBLY REPLACEMENT

Removal Procedure

1. Drain the transfer case fluid, if necessary. Refer to **Transfer Case Fluid Replacement**.
2. Remove the exhaust system. Refer to **Exhaust System Replacement (LSA-Coupe)** , **Exhaust System Replacement (LSA-Wagon)** , **Exhaust System Replacement (Single Exhaust)** , **Exhaust System Replacement (LFX/LFW-Coupe)** , **Exhaust System Replacement (LFX/LFW-Wagon)** .
3. Remove the rear propeller shaft. Refer to **Rear Propeller Shaft Replacement (RPO LSA)** , **Rear Propeller Shaft Replacement (RPO LFX or LFW with MXO)** , **Rear Propeller Shaft Replacement (RPO LFX or LFW with MX7 or MN6)** .

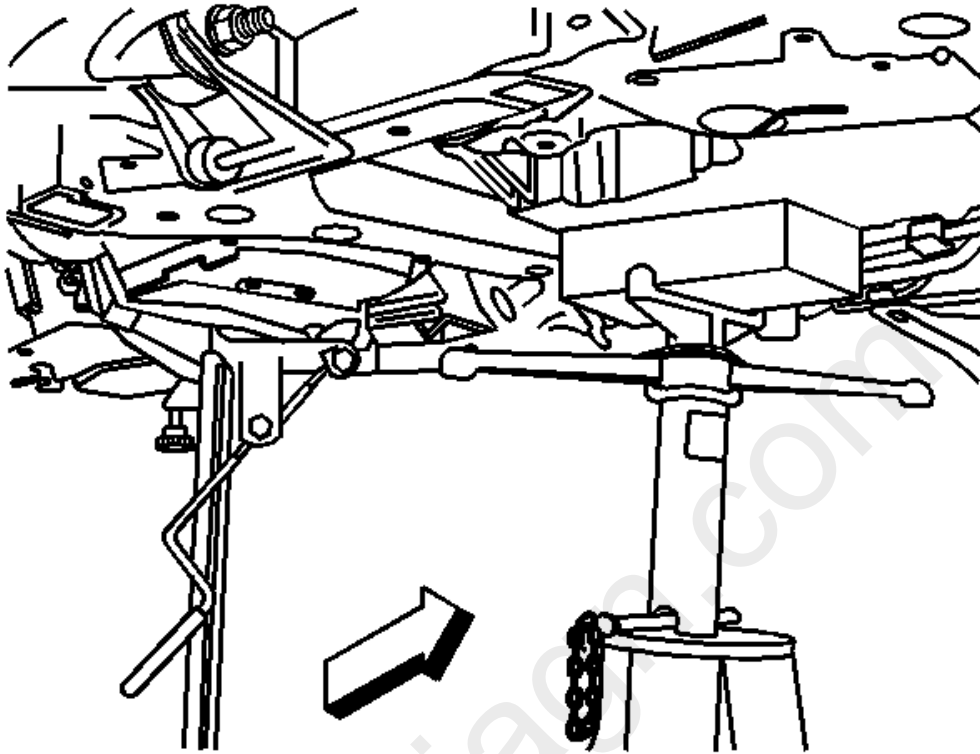


Fig. 20: Supporting Transmission With Jack & Block Of Wood
Courtesy of GENERAL MOTORS COMPANY

4. Support the transmission with a suitable screw jack and a block of wood.
5. Remove the transmission mount. Refer to **Transmission Mount Replacement (Except AWD and CTS-V)** , **Transmission Mount Replacement (Automatic AWD)** , **Transmission Mount Replacement (CTS-V)** .
6. Disconnect the shift linkage at the control lever. Refer to **Shift Control Linkage Replacement (Rear Wheel Drive)** , **Shift Control Linkage Replacement (All Wheel Drive)** .
7. Using the jack, lower the transmission enough to access the transmission mount-to-transfer case mounting bolts.

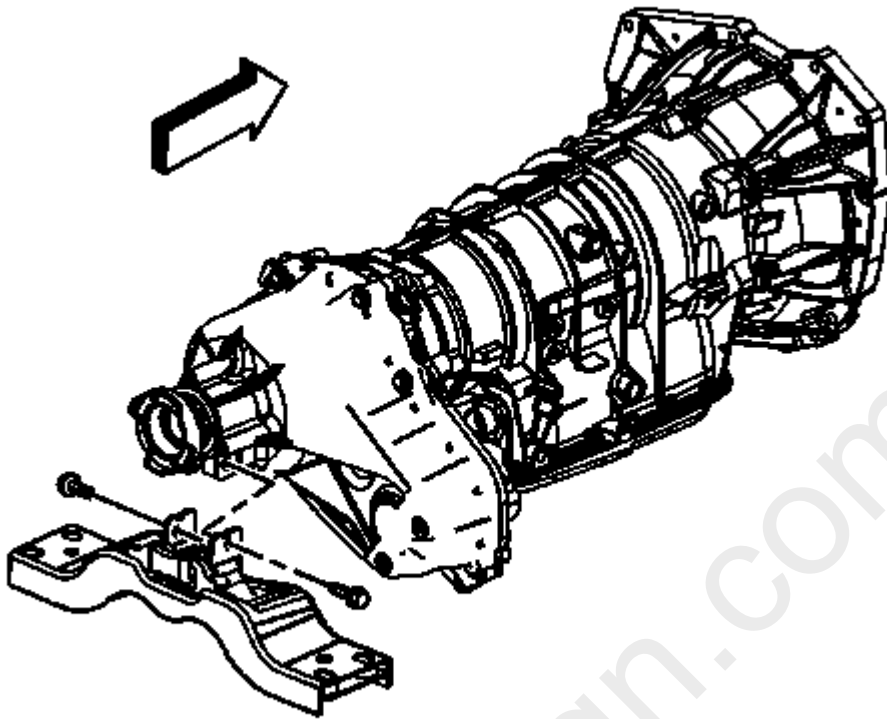


Fig. 21: View Of Transmission Mount
Courtesy of GENERAL MOTORS COMPANY

8. Remove the vent hose from the transmission mount assembly.
9. Remove the transmission mount-to-transfer case mounting bolts.
10. Remove the transmission mount assembly from the vehicle.
11. Remove the front propeller shaft. Refer to **Front Propeller Shaft Replacement** .
12. Disconnect the electrical connectors from the transfer case.

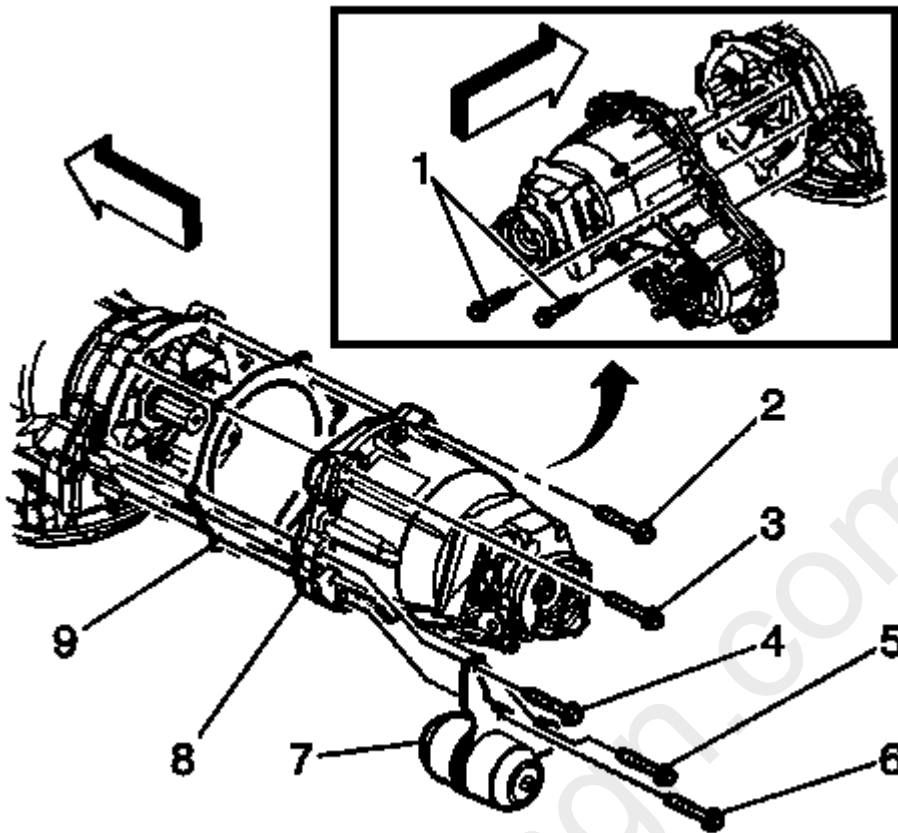


Fig. 22: Identifying Transfer Case Components
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not remove the jack and block of wood from under the transmission.

13. Using another suitable adjustable jack, support the transfer case.
14. Remove the transfer case bolts (1-6).
15. Remove the transfer case dampener (7).
16. Remove the transfer case (8).
17. Remove the transfer case gasket (9).

Installation Procedure

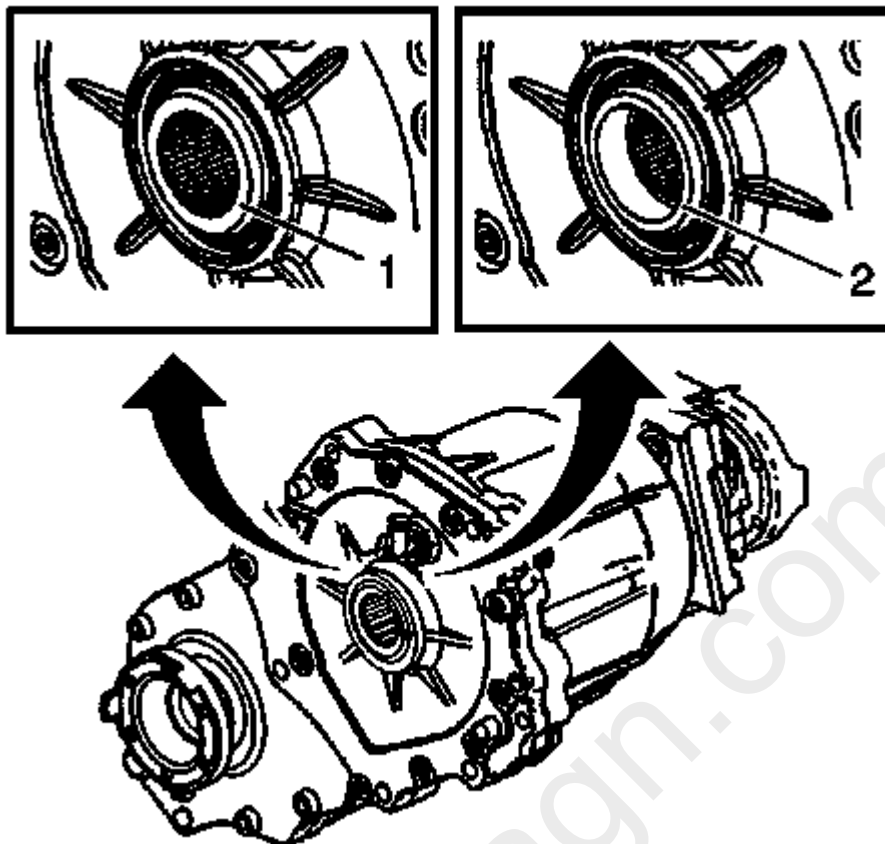


Fig. 23: View Of Input Shaft

Courtesy of GENERAL MOTORS COMPANY

1. All 2011 model year transfer cases have a machined ID surface at the opening of the input shaft (2). Refer to Build Variations within **Transfer Case Description and Operation** for additional information.

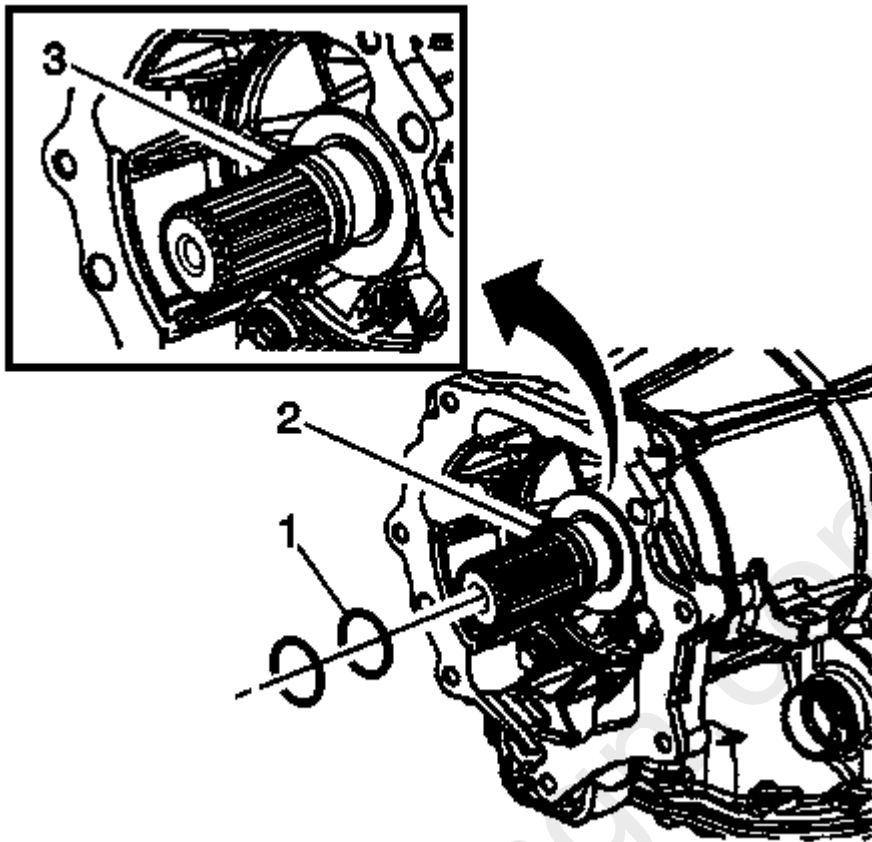


Fig. 24: View Of O-ring

Courtesy of GENERAL MOTORS COMPANY

2. All 2011 model year transmissions have an O-ring (3) located in the groove of the output shaft. For second design applications, inspect the O-ring (3) for damage. Replace as required. Second design output shafts do not require installation of two additional O-rings.

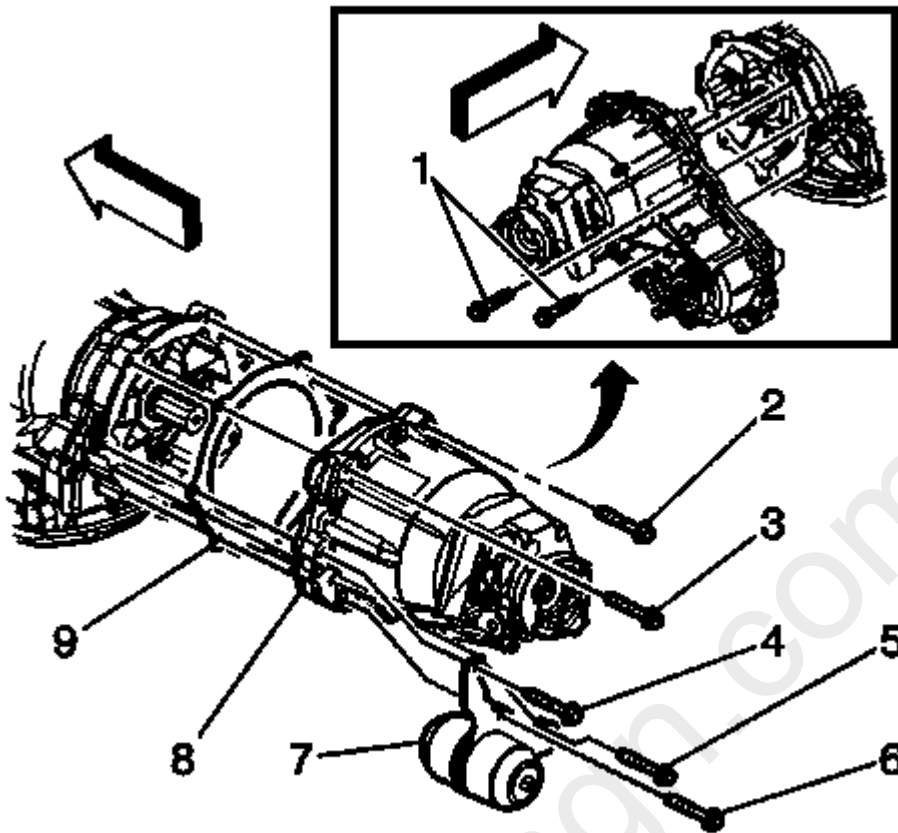


Fig. 25: Identifying Transfer Case Components
Courtesy of GENERAL MOTORS COMPANY

3. Apply grease GM P/N 1051344 (Canadian P/N 993037), or equivalent, on the input splines only. Start at the front edge of the splines and apply a continuous pattern around the inside diameter (ID) to completely fill the splines from front to rear.
4. Install the transfer case gasket (9).
5. Install the transfer case (8).
6. Install the transfer case dampener (7).

CAUTION: Refer to Fastener Caution .

7. Install the transfer case bolts (1-6) and tighten to 60 N.m (44 lb ft).
8. Remove the adjustable jack from the transfer case.
9. Connect the electrical connectors to the transfer case.

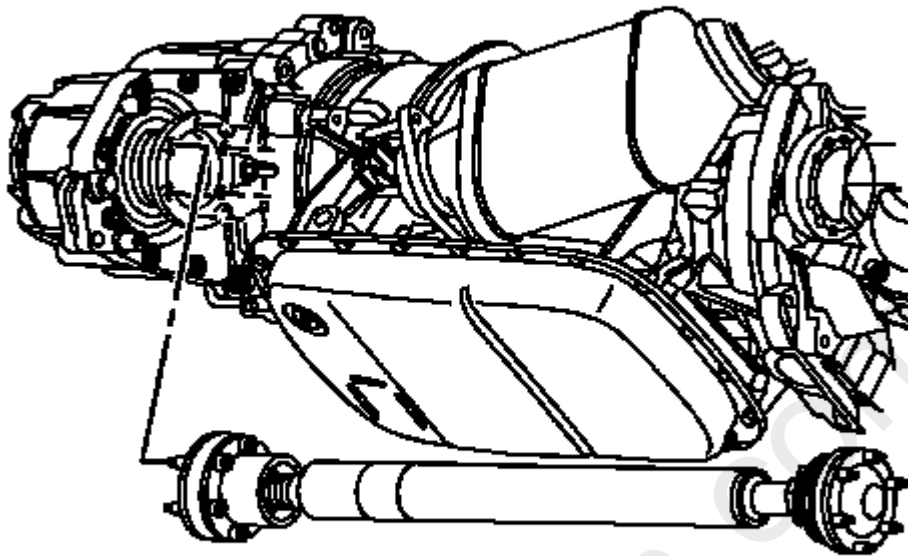


Fig. 26: Installing Propeller Shaft To Transfer Case Flange
Courtesy of GENERAL MOTORS COMPANY

10. Install the transmission mount assembly. Refer to **Transmission Mount Replacement (Except AWD and CTS-V)** , **Transmission Mount Replacement (Automatic AWD)** , **Transmission Mount Replacement (CTS-V)** .
11. Install the vent hose to the transmission mount assembly.
12. Remove the jack and block of wood from under the transmission.
13. Connect the shift linkage to the control lever. Refer to **Shift Control Linkage Replacement (Rear Wheel Drive)** , **Shift Control Linkage Replacement (All Wheel Drive)** .
14. Install the front propeller shaft. Refer to **Front Propeller Shaft Replacement** .
15. Install the rear propeller shaft. Refer to **Rear Propeller Shaft Replacement (RPO LSA)** , **Rear Propeller Shaft Replacement (RPO LFX or LFW with MXO)** , **Rear Propeller Shaft Replacement (RPO LFX or LFW with MX7 or MN6)** .
16. Install the exhaust system. Refer to **Exhaust System Replacement (LSA-Coupe)** , **Exhaust System Replacement (LSA-Wagon)** , **Exhaust System Replacement (Single Exhaust)** , **Exhaust System Replacement (LFX/LFW-Coupe)** , **Exhaust System Replacement (LFX/LFW-Wagon)** .
17. Refill the transfer case with fluid. Refer to **Transfer Case Fluid Replacement**.

REPAIR INSTRUCTIONS - OFF VEHICLE

TRANSFER CASE DISASSEMBLE

Dampener and Rear Output Flange Removal

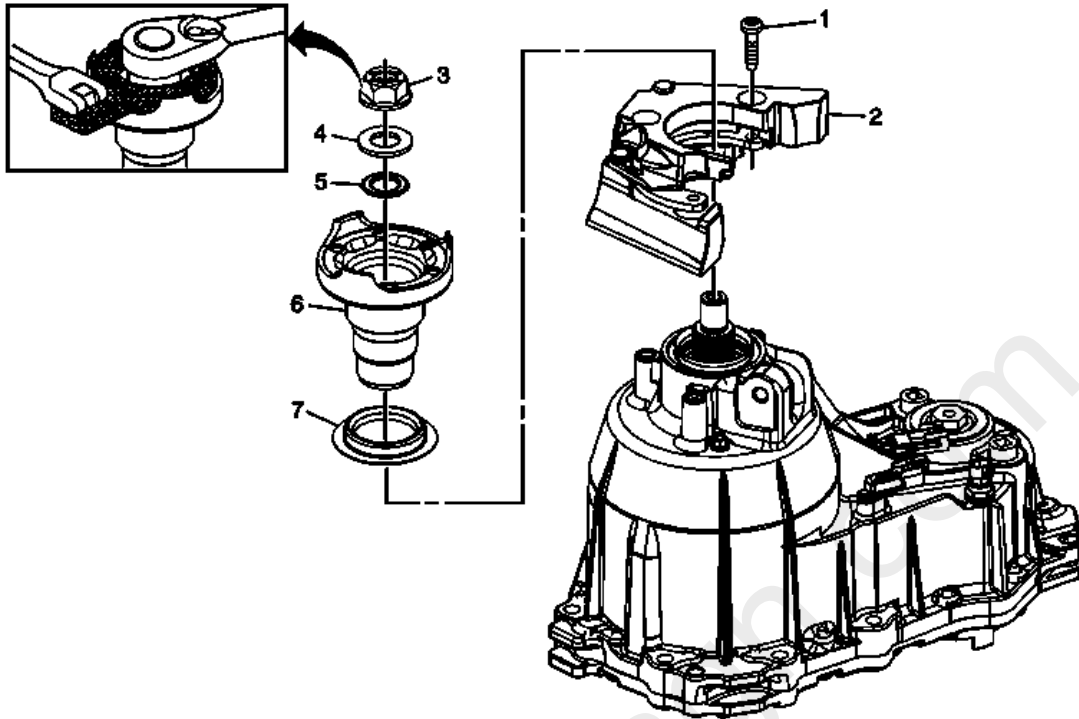


Fig. 27: View Of Dampener and Rear Output Flange Assembly
Courtesy of GENERAL MOTORS COMPANY

Dampener and Rear Output Flange Removal

Callout	Component Name
1	Transfer Case Vibration Dampener Bolt
2	Transfer Case Vibration Dampener
3	Transfer Case Rear Output Shaft Flange Nut Special Tools DT-48847 Pinion Flange Holder For equivalent regional tools, refer to Special Tools .
4	Transfer Case Rear Output Shaft Thrust Washer
5	Transfer Case Rear Output Shaft Flange O-ring Seal
6	Transfer Case Rear Output Shaft Flange Assembly NOTE: Use a 2 Jaw Puller to remove the flange.
7	Transfer Case Rear Output Shaft Seal Dirt Deflector NOTE: Remove only if damaged.

Vent Assembly, Drain Plug, Fill Plug, and Temperature Sensor Removal

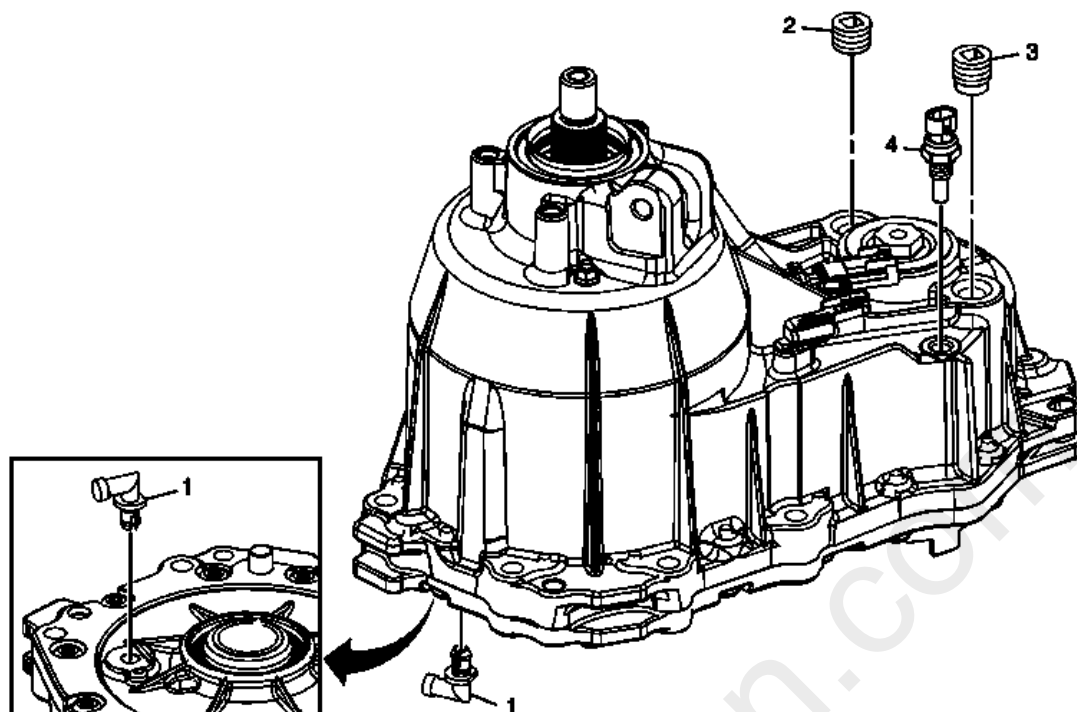


Fig. 28: View Of Vent Assembly, Drain Plug, Fill Plug, and Temperature Switch Assembly
Courtesy of GENERAL MOTORS COMPANY

Vent Assembly, Drain Plug, Fill Plug, and Temperature Sensor Removal

Callout	Component Name
1	Transfer Case Vent Assembly NOTE: Remove only if damaged or blocked.
2	Transfer Case Oil Fill Plug
3	Transfer Case Oil Drain Plug - Magnetic
4	Transfer Case Temperature Sensor Assembly

Front Output Shaft Removal

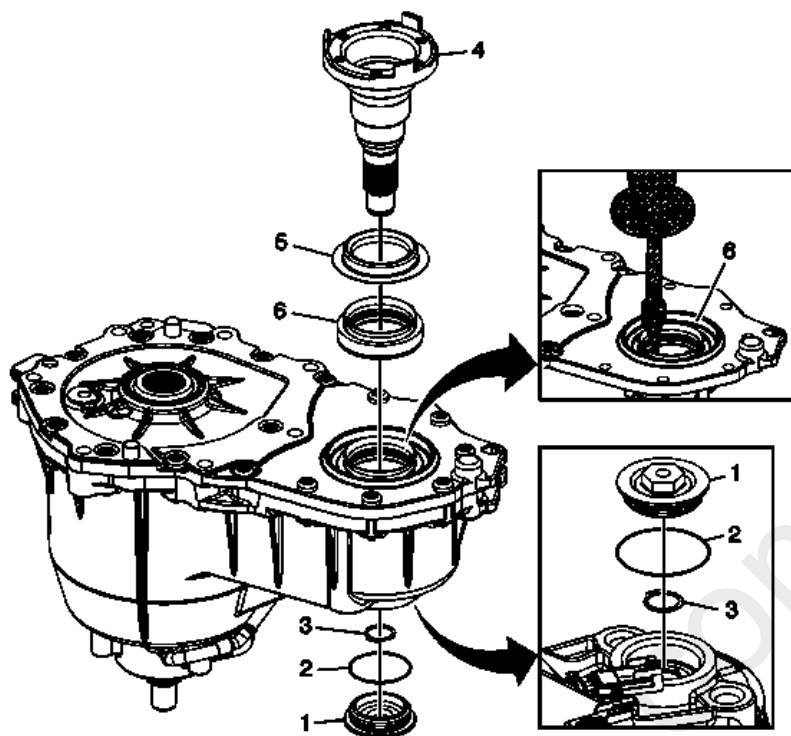


Fig. 29: View Of Front Output Shaft
Courtesy of GENERAL MOTORS COMPANY

Front Output Shaft Removal

Callout	Component Name
1	Transfer Case Front Output Shaft Hole Plug
2	Transfer Case O-ring Seal
3	Transfer Case Front Output Shaft Bearing Retaining Ring
4	Transfer Case Front Output Shaft
5	Transfer Case Front Output Shaft Seal Dirt Deflector NOTE: Remove only if damaged.
6	Transfer Case Front Output Shaft Seal Procedure Refer to Front Output Shaft Seal Replacement if only servicing the front output shaft seal. Special Tools • GE-02619-A Slide Hammer w/ Adapter • DT-45278 Seal Remover For equivalent regional tools, refer to Special Tools .

Cover, Apply Cam, and Clutch Pack Removal

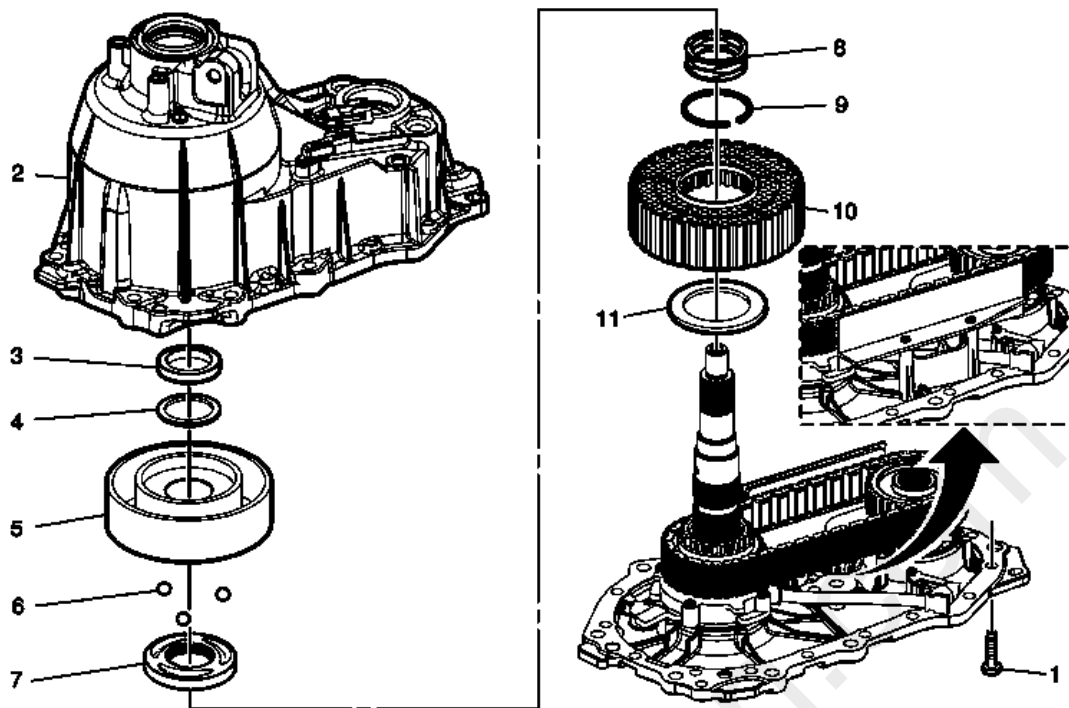


Fig. 30: Cover, Apply Cam, and Clutch Pack Components
Courtesy of GENERAL MOTORS COMPANY

Cover, Apply Cam, and Clutch Pack Removal

Callout	Component Name
1	Transfer Case Half Bolt
2	Transfer Case - Rear Half
3	Transfer Case Thrust Washer
4	Transfer Case Thrust Bearing
5	Transfer Case Rotor Assembly
6	Transfer Case Balls
7	Transfer Case Apply Cam
8	Transfer Case Wave Spring
9	Transfer Case Snap Ring
10	Clutch Pack Assembly Procedure Disassemble the clutch pack for inspection as required. The clutch pack components are serviced only as an assembly. Refer to <u>Transfer Case Front Drive Axle Viscous Clutch Disassemble</u> , and <u>Transfer Case Cleaning and Inspection</u> .
11	Transfer Case Front Output Shaft Drive Sprocket Spacer

Chain, Sprockets, Oil Pump, and Input Shaft Removal

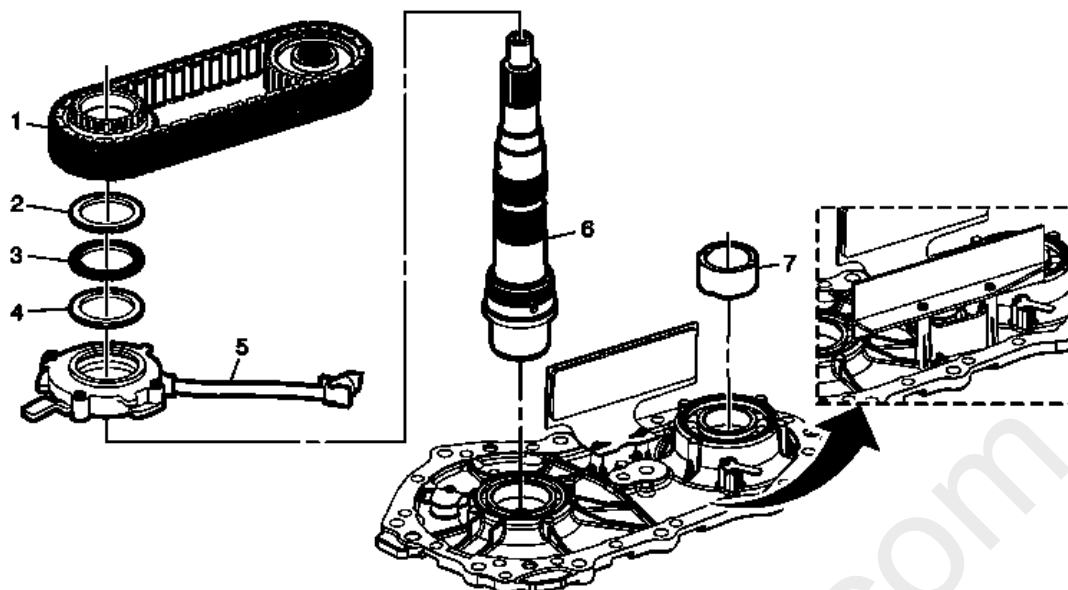


Fig. 31: Chain, Sprockets, Oil Pump, and Input Shaft Components
 Courtesy of GENERAL MOTORS COMPANY

Chain, Sprockets, Oil Pump, and Input Shaft Removal

Callout	Component Name
1	Transfer Case Front Output Shaft Drive Chain Assembly Procedure: Remove the drive chain assembly, transfer case front output shaft drive sprocket, and the transfer case front output shaft driven sprocket simultaneously. NOTE: Note the orientation of the single blue link on the chain. The link should be facing upward. It is important to re-assemble the chain in the same orientation that it was found.
2	Transfer Case Front Output Shaft Drive Sprocket Thrust Washer
3	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly
4	Transfer Case Front Output Shaft Drive Sprocket Thrust Washer
5	Transfer Case Oil Pump Assembly NOTE: Loosen the pump suction hose clamp bolt.
6	Transfer Case Input Shaft Assembly
7	Transfer Case Front Output Shaft Driven Sprocket Spacer

Coil Removal

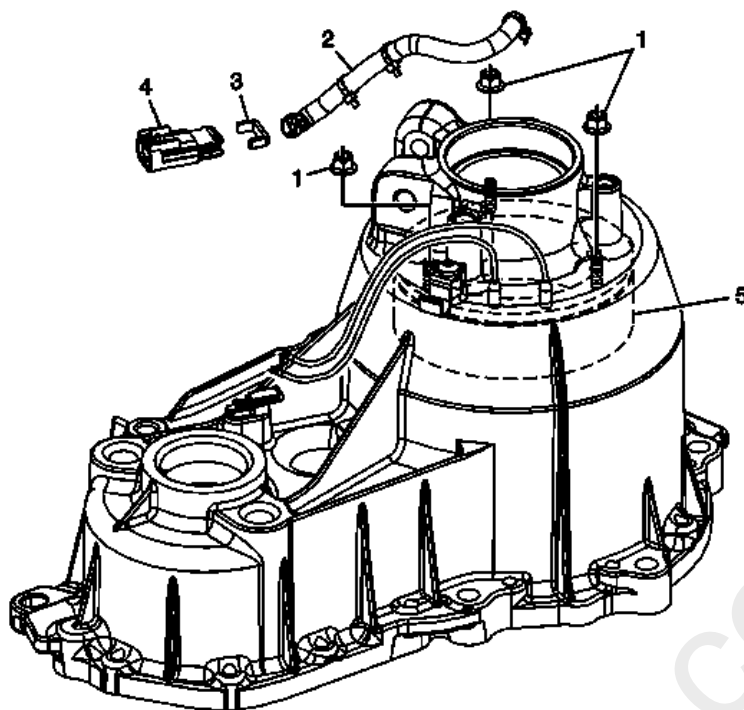


Fig. 32: View Of Coil

Courtesy of GENERAL MOTORS COMPANY

Coil Removal

Callout	Component Name
Preliminary Procedure	
Remove the coil only if required, due to damage or leakage.	
1	Transfer Case Coil Nut (Qty: 3)
2	Transfer Case Clutch Coil Harness Protector
3	Transfer Case Clip
	NOTE: The clip must be disassembled in order to remove the coil.
4	Transfer Case Coil Connector Assembly
5	Transfer Case Coil Assembly

Chain Snubber and Vent Baffle Removal

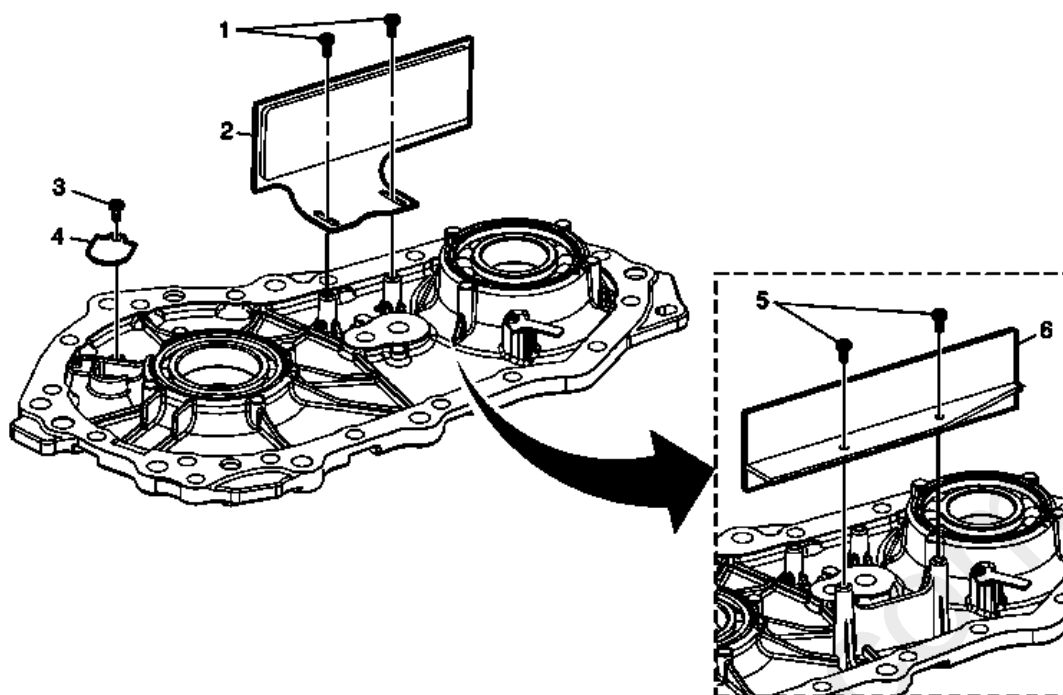


Fig. 33: Chain Snubber and Vent Baffle Components
 Courtesy of GENERAL MOTORS COMPANY

Chain Snubber and Vent Baffle Removal

Callout	Component Name
1	Transfer Case Front Output Shaft Drive Chain Snubber Bolt (Qty: 2)
2	Transfer Case Front Output Shaft Drive Chain Snubber
3	Transfer Case Vent Baffle Bolt
4	Transfer Case Vent Baffle
5	Transfer Case Front Output Shaft Drive Chain Coast Side Snubber Bolt (Qty: 2) - Model Dependent
6	Transfer Case Front Output Shaft Drive Chain Coast Side Snubber - Model Dependent

TRANSFER CASE FRONT DRIVE AXLE VISCOUS CLUTCH DISASSEMBLE

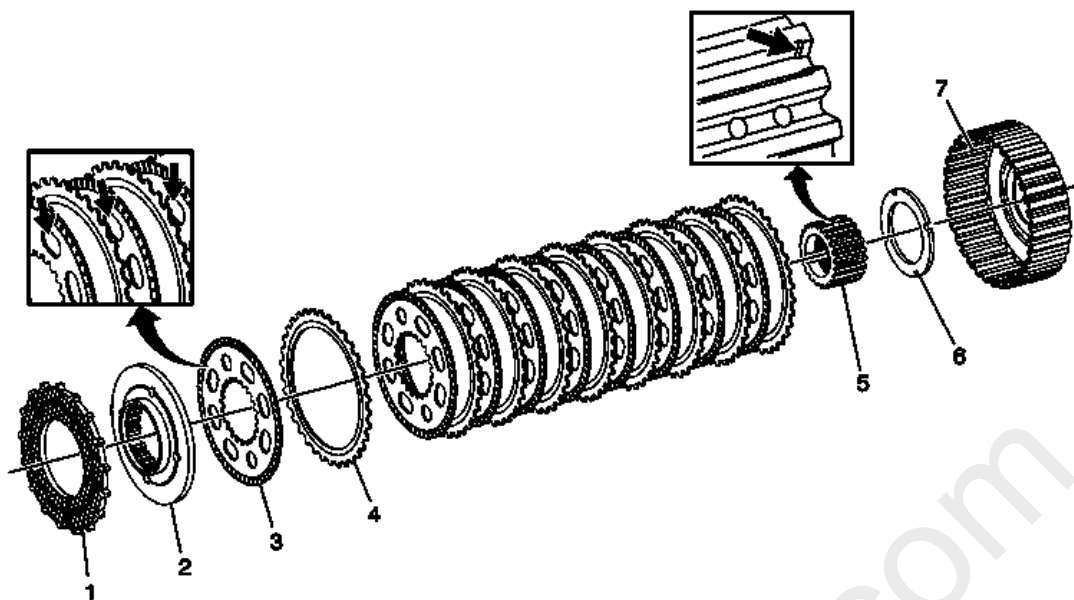


Fig. 34: Transfer Case Front Drive Axle Viscous Clutch Components
 Courtesy of GENERAL MOTORS COMPANY

Transfer Case Front Drive Axle Viscous Clutch Disassemble

Callout	Component Name
1	Transfer Case Armature
2	Transfer Case Pressure Plate
3	Transfer Case Friction Plate
4	Transfer Case Separator Plate
5	Transfer Case Clutch Hub
6	Transfer Case Thrust Plate
7	Transfer Case Clutch Pack Housing

TRANSFER CASE CLEANING AND INSPECTION

Transfer Case and Cover Cleaning and Inspection

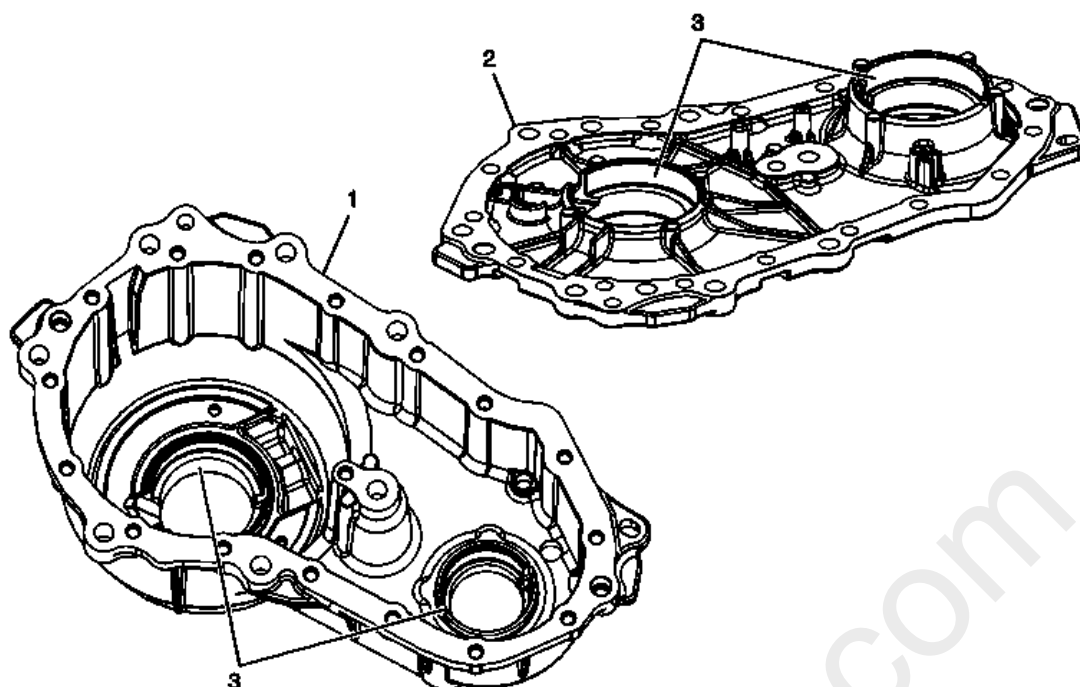


Fig. 35: View Of Transfer Case and Cover
 Courtesy of GENERAL MOTORS COMPANY

Transfer Case and Cover 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	Transfer Case - Rear Half
2	Transfer Case - Front Half
3	Transfer Case Bearing Race Bores NOTE: Replace the rear case or front case if a race has spun or cracks are detected.

Clutch Components Cleaning and Inspection

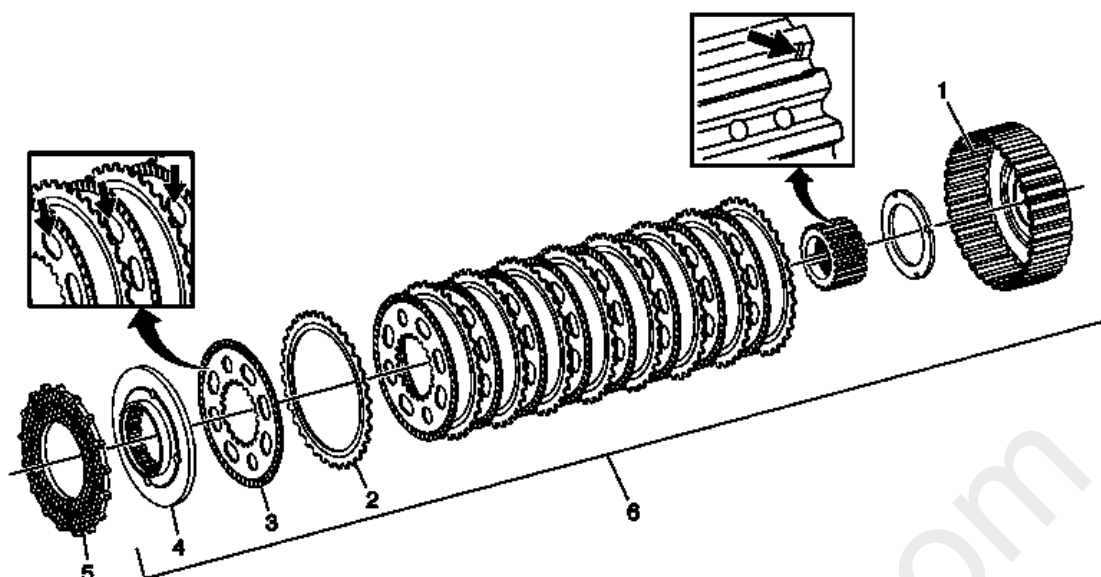


Fig. 36: View Of Clutch Components Cleaning and Inspection
 Courtesy of GENERAL MOTORS COMPANY

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 as an assembly (1-4). 2. Do not clean the clutch fiber plates in solvent. Other components may be cleaned in solvent.	
1	Transfer Case Clutch Pack Housing and Clutch Hub NOTE: Inspect the clutch housing and clutch hub 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 Friction Plate NOTE: - The friction plates are assembled with the lube holes aligned. This provides an unrestricted oil path when assembled. - Inspect the plates for worn, scored, or burnt friction material. - Inspect the plates for flatness and warping.
	Transfer Case Separator Plate

3	NOTE: • The friction plates are assembled with the lube holes aligned. This provides an unrestricted oil path when assembled. • Inspect the plates for worn, scored, or burnt friction material. • Inspect the plates for flatness and warping.
4	Transfer Case Pressure Plate NOTE: Inspect the plates for flatness and warping.
5	Transfer Case Armature NOTE: Small scratches or wear patterns are allowed on the armature. Deep gouges or raised metal in armature require transfer case replacement. The armature is assembled in the clutch pack with the rounded edges on the spline teeth towards the pack. The armature is not serviced.
6	Transfer Case Clutch Pack Assembly Procedure If the clutch pack assembly is replaced, a 12.7 k ohm clutch coil resistor should be used in place of the pre-existing resistor. If the resistor is replaced due to loss or damage without replacing the clutch pack, replace with one of the same resistance and refer to <u>Transfer Case Clutch Coil Resistor Replacement</u>.

Chain, Sprockets, and Snubber Cleaning and Inspection

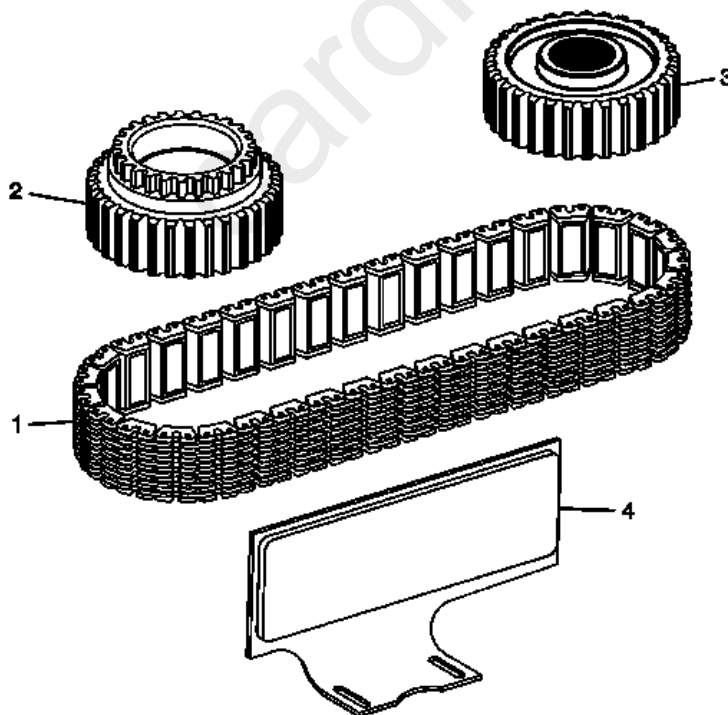


Fig. 37: View Of Chain, Sprockets, and Snubber
 Courtesy of GENERAL MOTORS COMPANY

Chain, Sprockets, and Snubber 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	Transfer Case Front Output Shaft Drive Chain Assembly NOTE: Inspect the chain for loose links or pins, binding links, embedded debris, and worn tooth surfaces.
2	Transfer Case Front Output Shaft Drive Sprocket NOTE: Inspect the sprockets for chipped teeth, embedded debris, and excessively worn gear surfaces. Slight wear marks are normal.
3	Transfer Case Front Output Shaft Driven Sprocket NOTE: Inspect the sprockets for chipped teeth, embedded debris, and excessively worn gear surfaces. Slight wear marks are normal.
4	Transfer Case Front Output Shaft Drive Chain Snubber NOTE: Inspect the snubber for an excessively worn or gouged lining. Slight wear marks are normal.

Input Shaft and Front Output Shaft Cleaning and Inspection

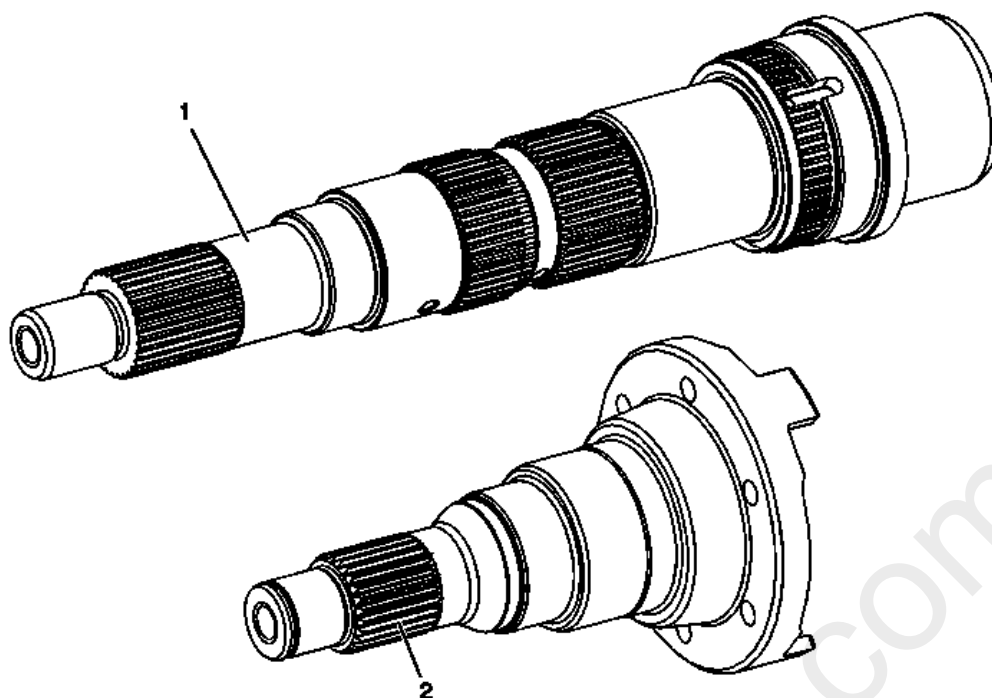


Fig. 38: View Of Input Shaft and Front Output Shaft
 Courtesy of GENERAL MOTORS COMPANY

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	Transfer Case Input Shaft Assembly NOTE: • Inspect the bearing journals for scoring, pitting, or excessive wear. • Do not attempt to smooth roughness in the bearing journals. • Inspect the splines for damage or excessive wear. Witness marks are normal.
2	Transfer Case Front Output Shaft NOTE: • Inspect the bearing journals for scoring, pitting, or excessive wear. • Do not attempt to smooth roughness in the bearing journals. • Inspect the splines for damage or excessive wear. Witness marks are normal.

Coil Assembly Cleaning and Inspection

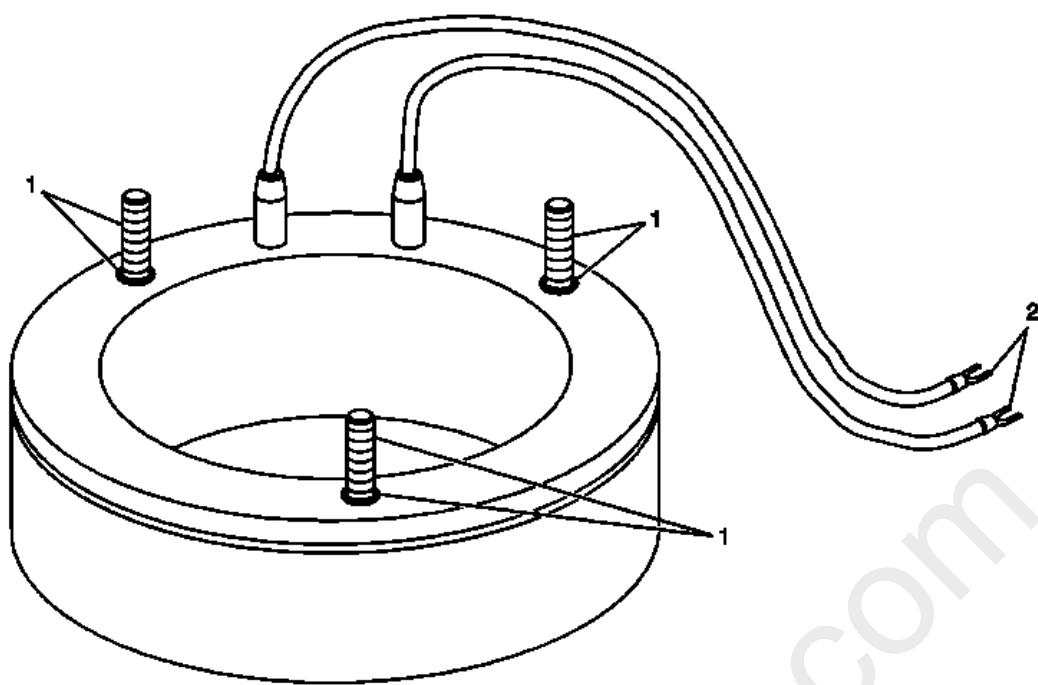


Fig. 39: View Of Coil Assembly
Courtesy of GENERAL MOTORS COMPANY

Coil Assembly Cleaning and Inspection

Callout	Component Name
Preliminary Procedures 1. Clean all components in solvent and air dry. 2. Inspect components and perform any repair procedure necessary to fix the damage. The coil is serviced as an assembly.	
1	Transfer Case Coil Assembly Studs NOTE: Inspect the studs and O-rings for damage.
2	Transfer Case Coil Assembly Wires NOTE: Inspect the wires and terminals for damage. Repair, as required.

Oil Pump and Suction Pipe Assembly Cleaning and Inspection

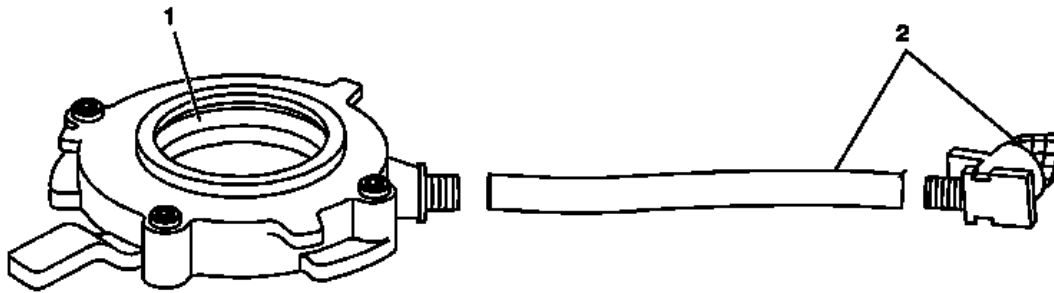


Fig. 40: View Of Oil Pump and Suction Pipe Assembly
Courtesy of GENERAL MOTORS COMPANY

Oil Pump and Suction Pipe Assembly Cleaning and Inspection

Callout	Component Name
Preliminary Procedures 1. Remove the oil pump suction hose from the screen and pump. 2. Clean all components in solvent and air dry. 3. Inspect components and perform any repair procedure necessary to fix the damage.	
1	Transfer Case Oil Pump Assembly NOTE: • Inspect the pump for free movement. Replace the pump if it is binding. • Do not disassemble the pump. The pump is serviced as an assembly.
2	Transfer Case Oil Pump Assembly Screen and Hose NOTE: Inspect the screen and hose for cracks, tears, or debris.

TRANSFER CASE FRONT DRIVE AXLE VISCOUS CLUTCH ASSEMBLY

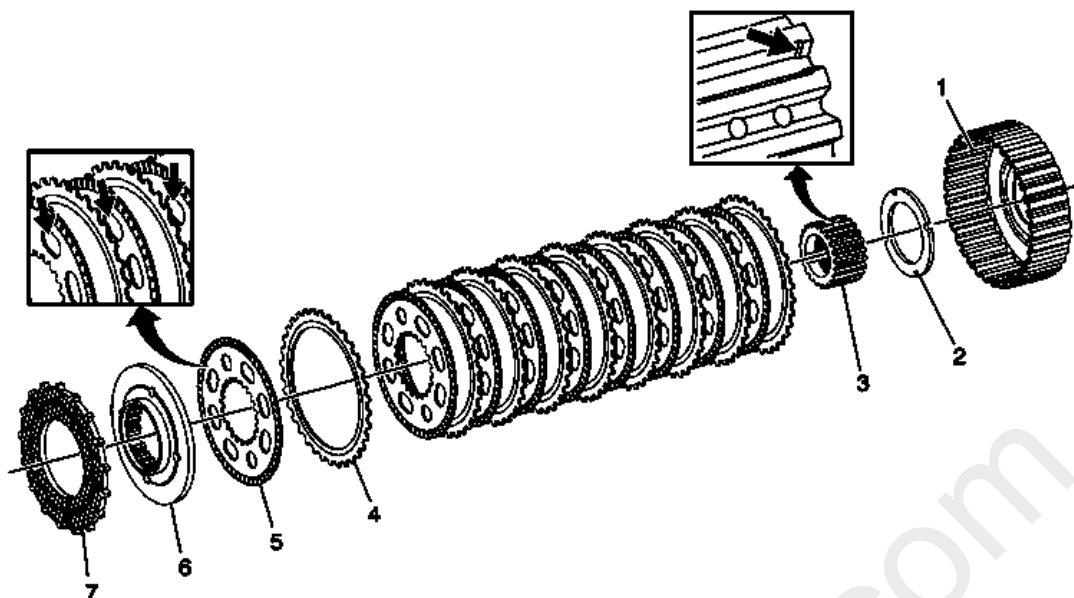


Fig. 41: Transfer Case Front Drive Axle Viscous Clutch Components
 Courtesy of GENERAL MOTORS COMPANY

Transfer Case Front Drive Axle Viscous Clutch Assemble

Callout	Component Name
1	Transfer Case Clutch Pack Housing
2	Transfer Case Thrust Plate
3	Transfer Case Clutch Hub
4	Transfer Case Separator Plate
5	Transfer Case Friction Plate
6	Transfer Case Pressure Plate
7	Transfer Case Armature

FRONT OUTPUT SHAFT FRONT BEARING REPLACEMENT

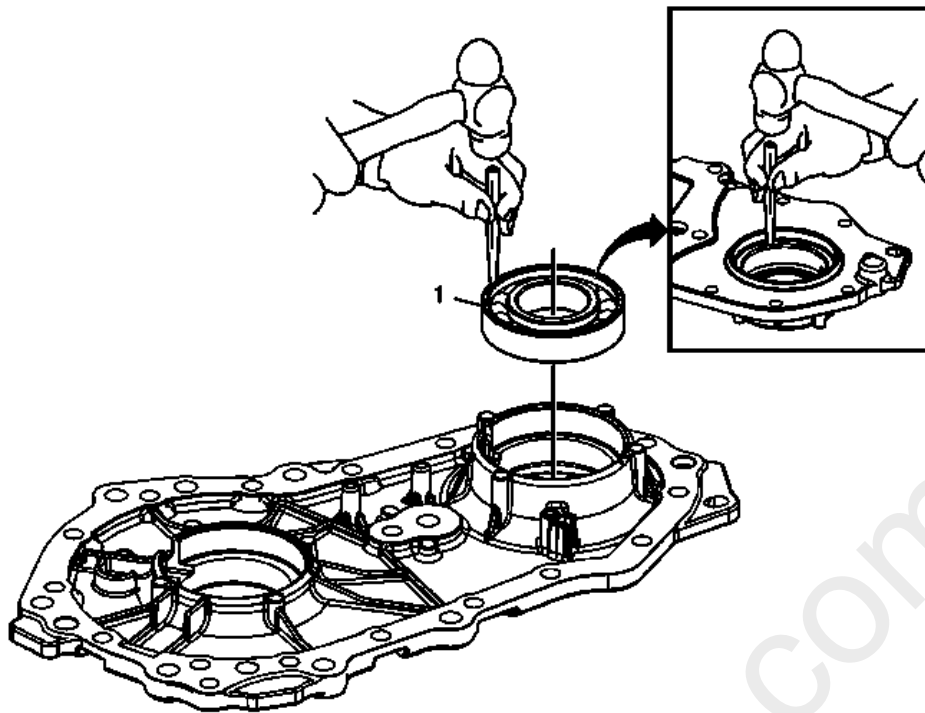


Fig. 42: View Of Front Output Shaft Front Bearing
 Courtesy of GENERAL MOTORS COMPANY

Front Output Shaft Front Bearing Replacement

Callout	Component Name
1	Transfer Case Front Output Shaft Front Bearing
	NOTE: • Remove the bearing only if it is to be replaced. • Use a hammer and suitable punch to remove the bearing.

INPUT SHAFT BEARING REPLACEMENT

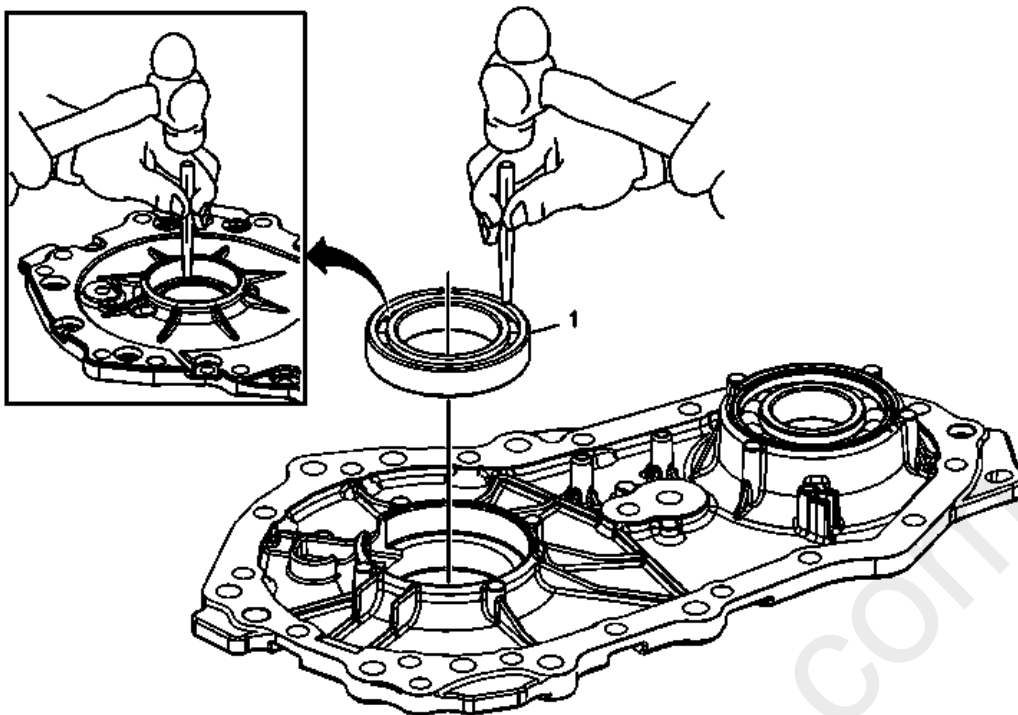


Fig. 43: View Of Input Shaft Bearing
 Courtesy of GENERAL MOTORS COMPANY

Input Shaft Bearing Replacement

Callout	Component Name
1	Transfer Case Input Shaft Bearing
	NOTE: • Remove the bearing only if it is to be replaced. • Use a hammer and a suitable punch to remove the bearing.

REAR OUTPUT SHAFT REAR BEARING REPLACEMENT

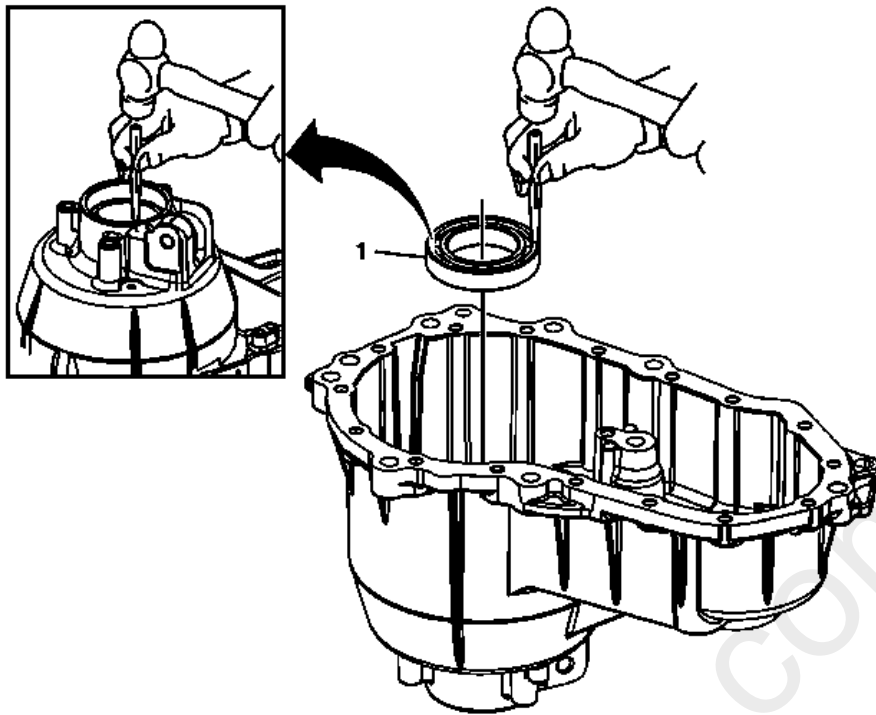


Fig. 44: View Of Rear Output Shaft Rear Bearing
 Courtesy of GENERAL MOTORS COMPANY

Rear Output Shaft Rear Bearing Replacement

Callout	Component Name
1	Transfer Case Rear Output Shaft Rear Bearing
	NOTE: • Remove the bearing only if it is to be replaced. • Use a hammer and a suitable punch to remove the bearing.

FRONT OUTPUT SHAFT SEAL REPLACEMENT

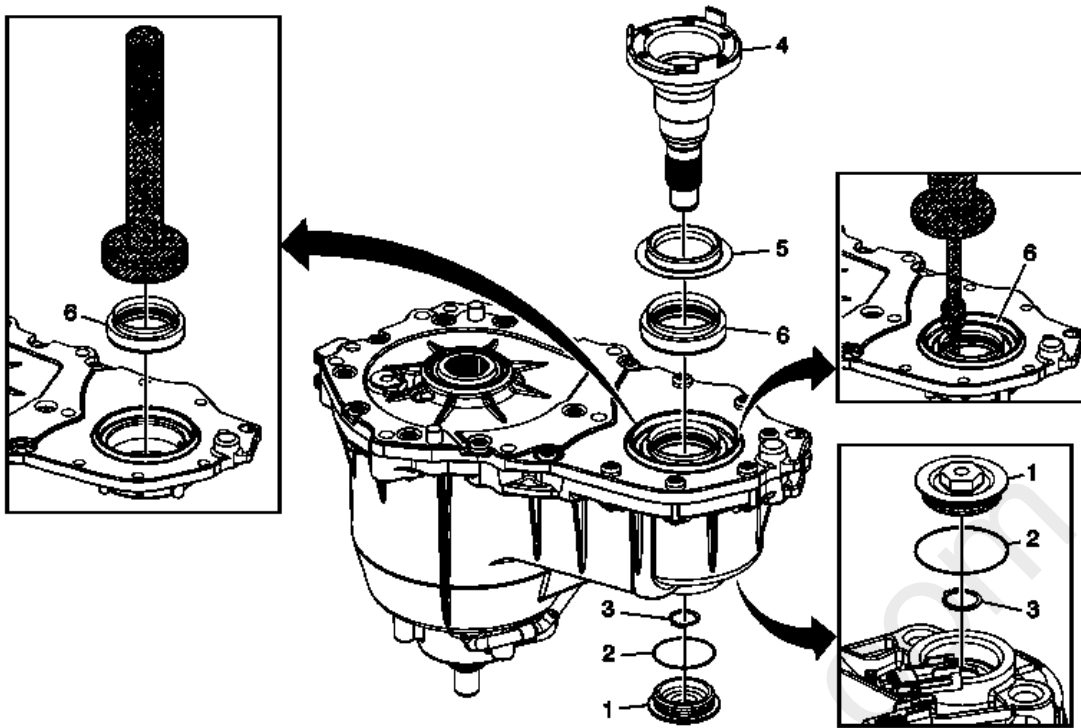


Fig. 45: View Of Front Output Shaft Seal
 Courtesy of GENERAL MOTORS COMPANY

Front Output Shaft Seal Replacement

Callout	Component Name
1	Transfer Case Front Output Shaft Hole Plug
2	Transfer Case O-Ring Seal
3	Transfer Case Front Output Shaft Bearing Retaining Ring
4	Transfer Case Front Output Shaft
5	Transfer Case Front Output Shaft Seal Dirt Deflector NOTE: Remove the dirt deflector only if replacement is required.
6	Transfer Case Front Output Shaft Seal NOTE: If servicing ONLY the front output shaft seal, it is not necessary to disassemble the entire transfer case. Special Tools • GE-02619-A Slide Hammer w/ Adapter • DT-8092 Driver Handle • DT-45278 Seal Remover

- **DT-46268** Output Seal Installer

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

INPUT SHAFT SEAL REPLACEMENT

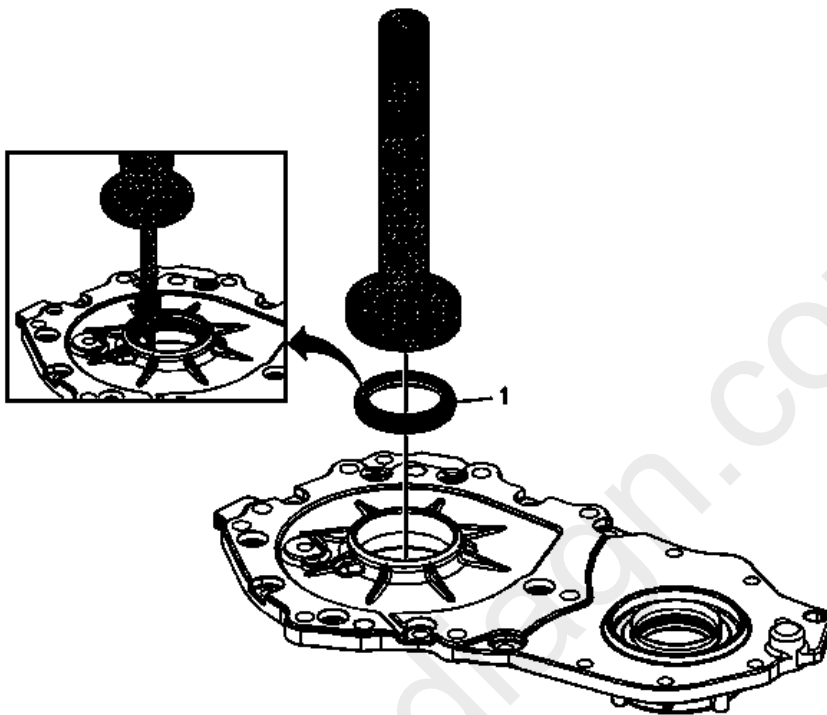


Fig. 46: View Of Input Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

Input Shaft Seal Replacement

Callout	Component Name
1	Transfer Case Input Shaft Seal Special Tools • GE-02619-A Slide Hammer w/Adapter • DT-8092 Driver Handle • DT-45278 Seal Remover • DT-46268 Output Seal Installer For equivalent regional tools, refer to Special Tools.

REAR OUTPUT SHAFT SEAL REPLACEMENT

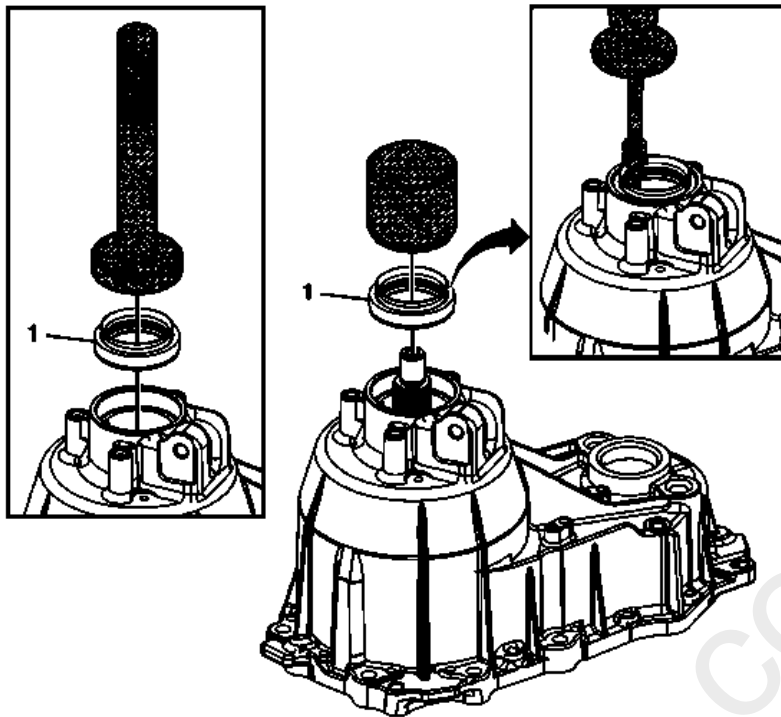


Fig. 47: View Of Rear Output Shaft Seal
 Courtesy of GENERAL MOTORS COMPANY

Rear Output Shaft Seal Replacement

Callout	Component Name
1	Rear Output Shaft Seal NOTE: • For seal replacement with the transfer case in the vehicle or assembled, use DT-47928-1 . • For seal replacement with the transfer case disassembled, use DT-48846 . Special Tools • DT-8092 Driver Handle • DT-45278 Seal Remover • DT-47928-1 Rear Seal Installer • DT-48846 Output Seal Installer • GE-02619-A Slide Hammer w/Adapter For equivalent regional tools, refer to Special Tools.

TRANSFER CASE ASSEMBLE

Coil Installation

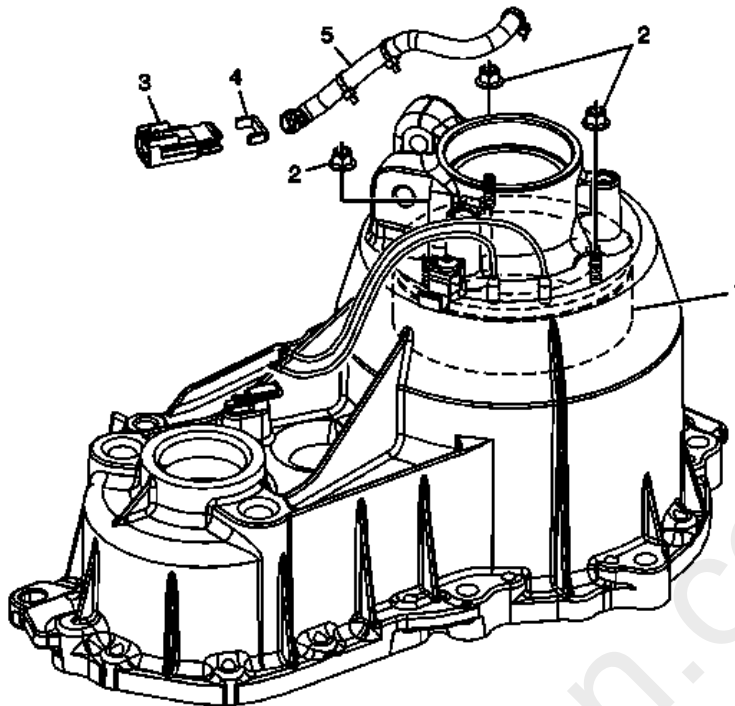


Fig. 48: View Of Coil Assembly
Courtesy of GENERAL MOTORS COMPANY

Coil Installation

Callout	Component Name
1	Transfer Case Coil Assembly
2	Transfer Case Coil Nut (Qty: 3)
3	Transfer Case Coil Connector Assembly
4	Transfer Case Clip
5	Transfer Case Clutch Coil Harness Protector
	NOTE: Install common tie wraps to secure the harness protector and seat the wire in the wire clip.

Chain Snubber and Vent Baffle Installation

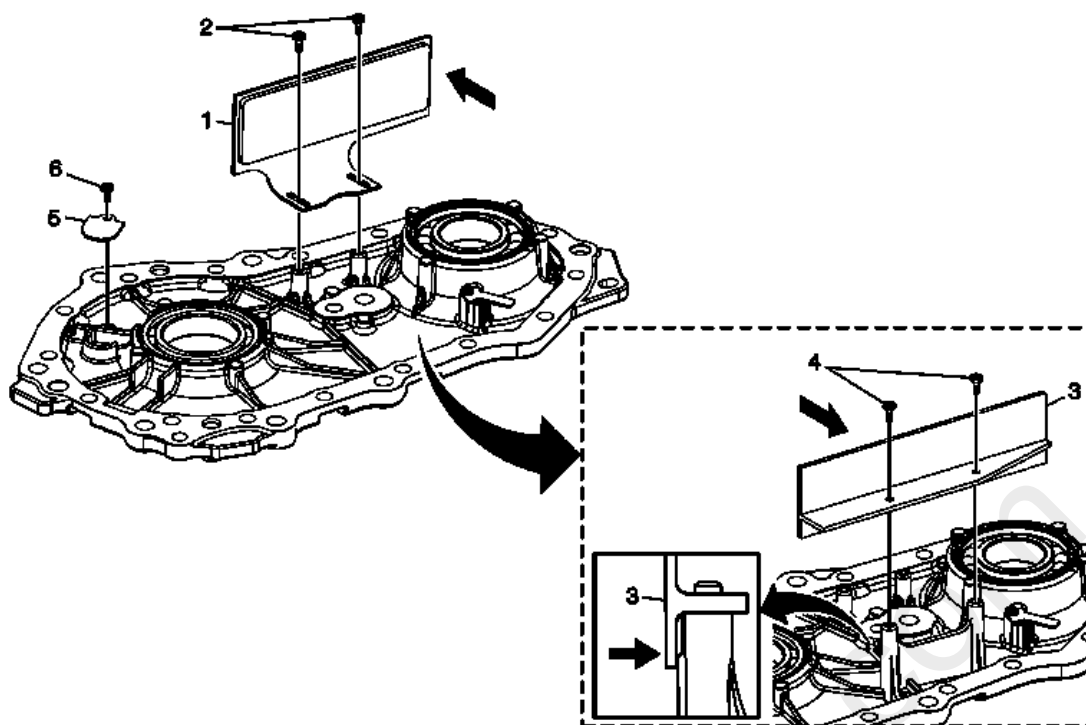


Fig. 49: Chain Snubber And Vent Baffle Components

Courtesy of GENERAL MOTORS COMPANY

Chain Snubber and Vent Baffle Installation

Callout	Component Name
1	Transfer Case Front Output Shaft Drive Chain Snubber
2	Transfer Case Front Output Shaft Drive Chain Snubber Bolt (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Procedure • Apply sealant GM P/N 12345382 (Canadian P/N 10953489), or equivalent, to the threads of the bolts. • Before tightening the snubber bolts, push the snubber to the outside of the case, so when assembled, the snubber is in the farthest position away from the chain, taking up all clearance. See arrow in the illustration above. Tighten 7 (62 lb in)
3	Transfer Case Front Output Shaft Drive Chain Coast Side Snubber - Model Dependent
	Transfer Case Front Output Shaft Drive Chain Coast Side Snubber Bolt (Qty: 2) - Model Dependent

4	Procedure • Apply sealant GM P/N 12345382 (Canadian P/N 10953489), or equivalent, to the threads of the bolts. • Before tightening the snubber bolts, push the snubber to the outside of the case. When assembled, the snubber is to contact the flange of the cover. Tighten 7 (62 lb in)
5	Transfer Case Vent Baffle
6	Transfer Case Vent Baffle Bolt (Qty: 1) Procedure • Apply sealant GM P/N 12345382 (Canadian P/N 10953489), or equivalent, to the threads of the bolts. • Assemble the dowel pins into the case half, if previously removed. Tighten 7 (62 lb in)

Chain, Sprockets, Oil Pump, Input Shaft, and Front Output Shaft Installation

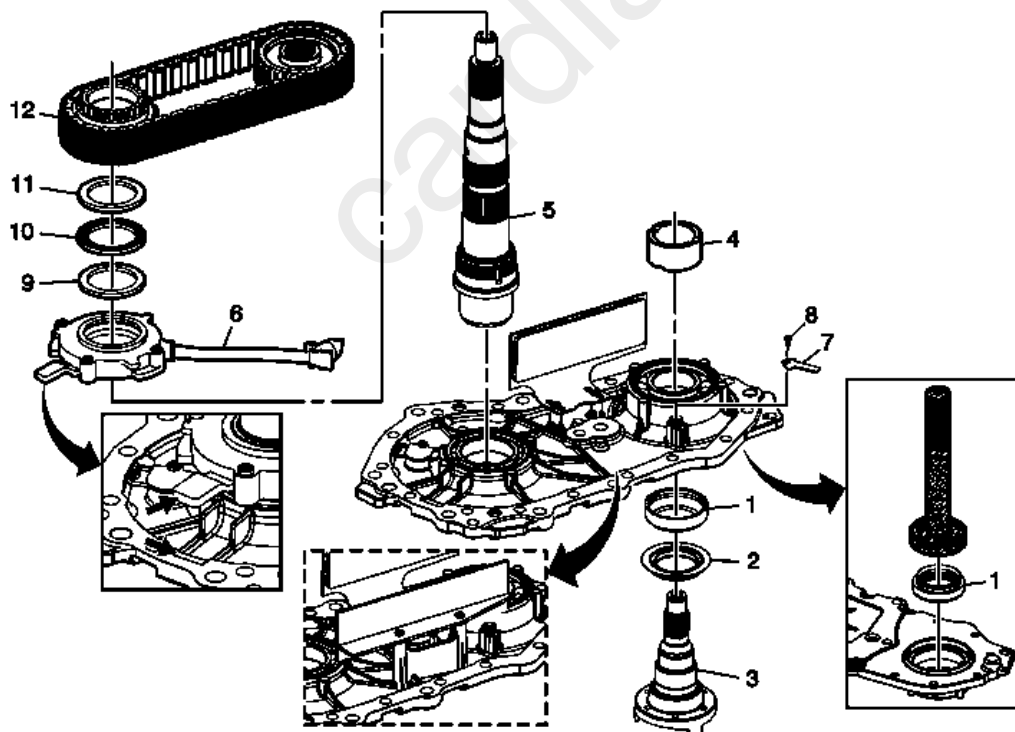


Fig. 50: Chain, Sprockets, Oil Pump, Input Shaft And Front Output Shaft Components

Courtesy of GENERAL MOTORS COMPANY

Chain, Sprockets, Oil Pump, Input Shaft, and Front Output Shaft Installation

Callout	Component Name
1	Transfer Case Front Output Shaft Seal Special Tools • DT-8092 Driver Handle • DT-46268 Output Seal Installer For equivalent regional tools, refer to Special Tools.
2	Transfer Case Front Output Shaft Seal Dirt Deflector NOTE: Replace only if removed or damaged.
3	Transfer Case Front Output Shaft
4	Transfer Case Front Output Shaft Driven Sprocket Spacer
5	Transfer Case Input Shaft Assembly
6	Transfer Case Oil Pump Assembly NOTE: • Center the gerotor gear spline inside the pump for ease of assembly. • Rotate the pump alignment tab until it aligns with the alignment mark on the case.
7	Transfer Case Oil Pump Suction Hose Clamp
8	Transfer Case Oil Pump Suction Hose Bolt CAUTION: Refer to <u>Fastener Caution</u> . Tighten 7 (62 lb in)
9	Transfer Case Front Output Shaft Drive Sprocket Thrust Washer
10	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly
11	Transfer Case Front Output Shaft Drive Sprocket Thrust Washer
12	Transfer Case Front Output Shaft Drive Chain Assembly Install the drive chain assembly, transfer case front output shaft drive sprocket, and the transfer case front output shaft driven sprocket simultaneously. Procedure: • Assemble the chain with the blue link facing up, unless noted differently during

disassembly.

- Assemble the drive sprocket with the clutch splines facing up.
- Assemble the driven sprocket with the center raised hub facing up.

Apply Cam and Clutch Pack Installation

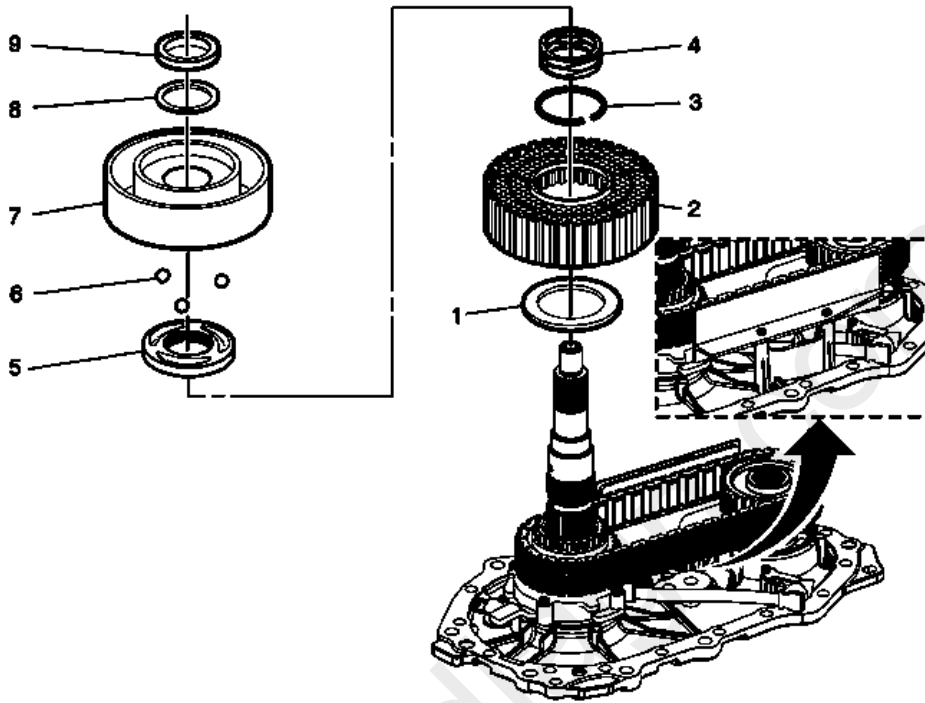


Fig. 51: Apply Cam And Clutch Pack Components
Courtesy of GENERAL MOTORS COMPANY

Apply Cam and Clutch Pack Installation

Callout	Component Name
1	Transfer Case Front Output Shaft Drive Sprocket Spacer
2	Transfer Case Clutch Pack Assembly and Armature
	Procedure:
	• Assemble the clutch pack as required. The clutch pack components are serviced only as an assembly. Refer to <u>Transfer Case Front Drive Axle Viscous Clutch Assemble</u>. • Inspect for the clutch hub and housing to be fully seated on the input shaft with no gap. The snap ring will not assemble if not fully seated.
3	Transfer Case Snap Ring
4	Transfer Case Wave Spring
5	Transfer Case Apply Cam

6	Transfer Case Balls
7	Transfer Case Rotor Assembly
8	Transfer Case Thrust Bearing
9	Transfer Case Thrust Washer Procedure: Always verify that the correct thrust washer is installed for proper clutch end-play. Replacement of internal components will alter the end-play. Refer to <u>Four Wheel Drive Clutch Shim Selection</u> .

Case Half and Front Output Shaft Hole Plug Installation

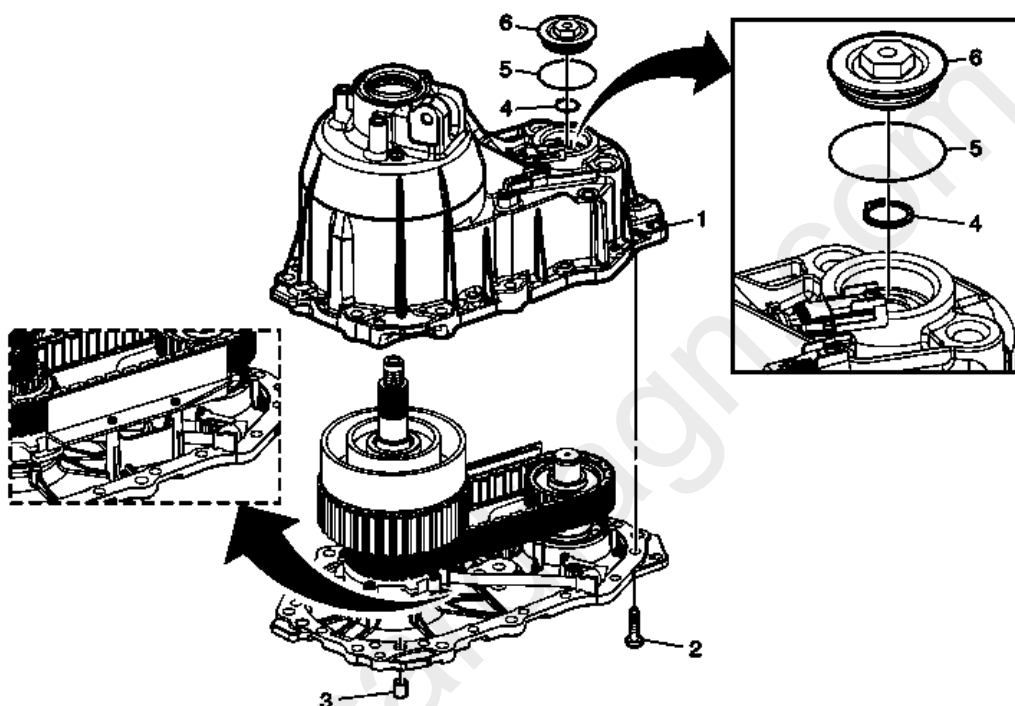


Fig. 52: Case Half And Front Output Shaft Hole Plug Components
Courtesy of GENERAL MOTORS COMPANY

Case Half and Front Output Shaft Hole Plug Installation

Callout	Component Name
1	Transfer Case - Rear Half NOTE: Apply a 3.175 mm (1/8 in) bead of room temperature vulcanizing (RTV) sealant, or equivalent, to the mating surface of the cover.
	Transfer Case Half Bolt CAUTION: Refer to <u>Fastener Caution</u> .

2	NOTE: The bolts are self-tapping and must be hand started. Do not use power-assisted tools to install the bolts. Tighten 27-35 (20-26 lb in)
3	Transfer Case Location Pin - If Removed
4	Transfer Case Front Output Shaft Bearing Retaining Ring
5	Transfer Case O-ring Seal NOTE: If the seal is removed, replace with a NEW seal.
6	Transfer Case Front Output Shaft Hole Plug Tighten 15-20 (11-14 lb ft)

Dampener and Rear Output Flange Installation

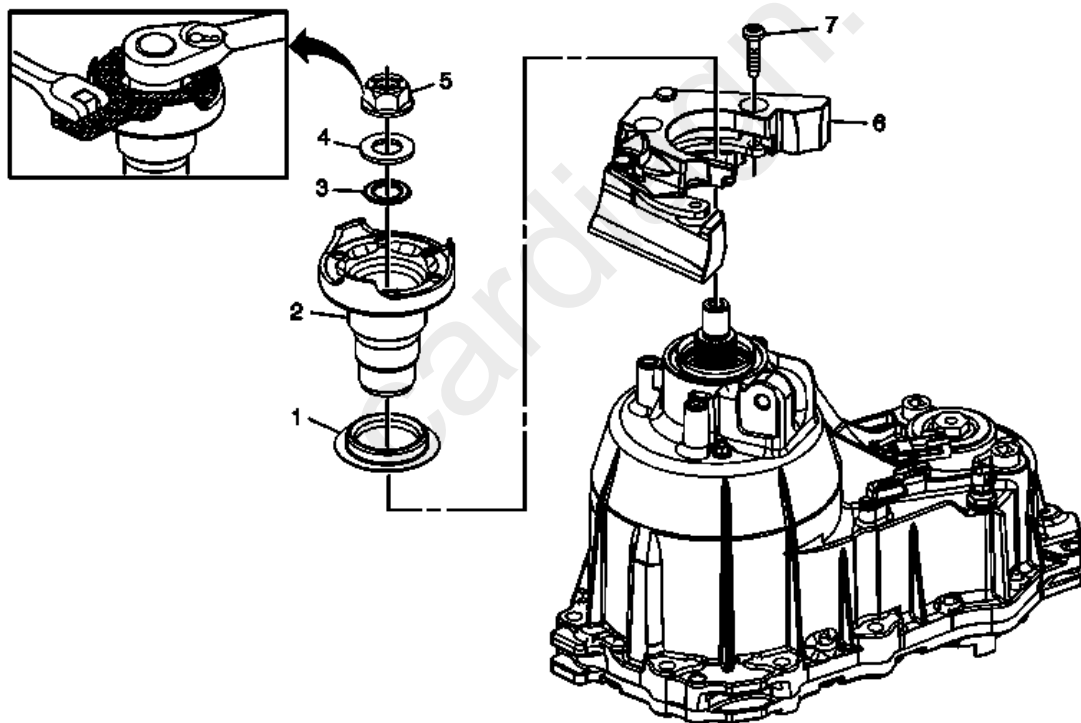


Fig. 53: View Of Dampener and Rear Output Flange
Courtesy of GENERAL MOTORS COMPANY

Dampener and Rear Output Flange Installation

Callout	Component Name
	Transfer Case Rear Output Shaft Seal Dirt Deflector

1	NOTE: Replace only if removed or damaged.
2	Transfer Case Rear Output Shaft Flange Assembly
3	Transfer Case Rear Output Shaft Flange O-ring Seal
4	Transfer Case Rear Output Shaft Thrust Washer
5	Transfer Case Rear Output Shaft Flange Nut CAUTION: Refer to <u>Fastener Caution</u> . Tighten 305-332 (225-245 lb ft) Special Tools DT-48847 Pinion Flange Holder For equivalent regional tools, refer to <u>Special Tools</u> .
6	Transfer Case Vibration Dampener
7	Transfer Case Vibration Dampener Bolt Tighten 27-35 (20-26 lb ft)

Vent Assembly, Drain Plug, Fill Plug, and Temperature Sensor Installation

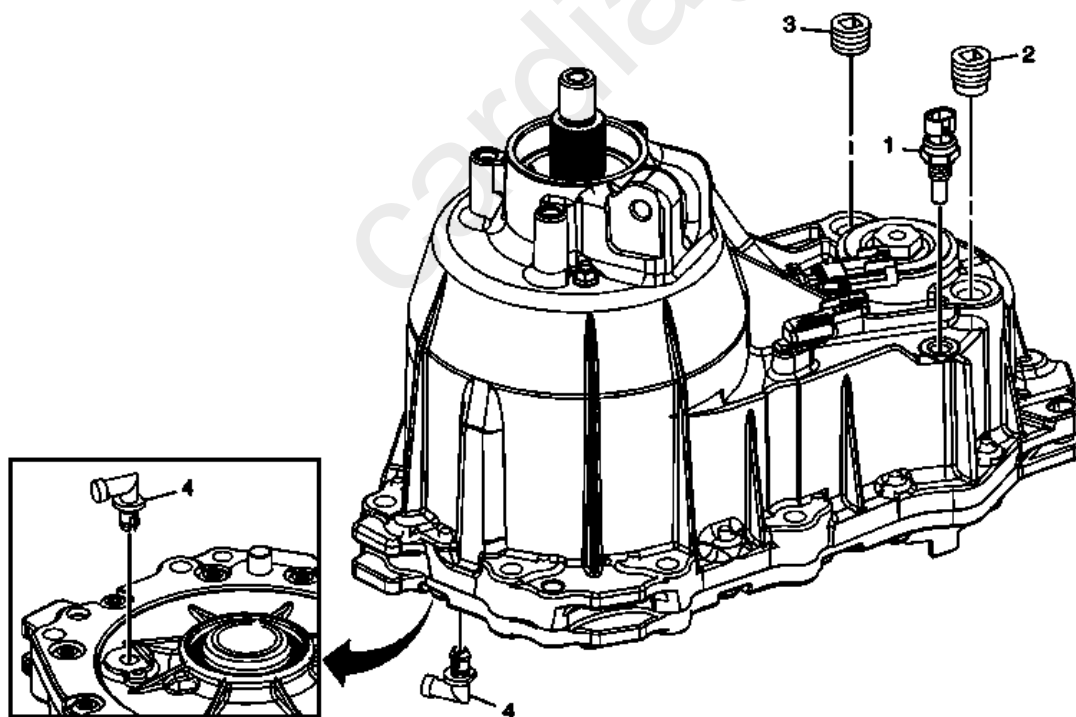


Fig. 54: View Of Vent Assembly, Drain Plug, Fill Plug, and Temperature Switch
 Courtesy of GENERAL MOTORS COMPANY

Vent Assembly, Drain Plug, Fill Plug, and Temperature Sensor Installation

Callout	Component Name
1	Transfer Case Temperature Sensor Assembly
2	Transfer Case Oil Drain Plug - Magnetic CAUTION: Refer to <u>Component Fastener Tightening Caution</u> . NOTE: Apply pipe sealant GM P/N 12346004 (Canadian P/N 10953480) to the drain plug before installation. Tighten 19-30 (14-22 lb ft)
3	Transfer Case Oil Fill Plug Procedure: • Apply pipe sealant GM P/N 12346004 (Canadian P/N 10953480) to the fill plug before installation. • Fill the transfer case with fluid. Refer to <u>Adhesives, Fluids, Lubricants, and Sealers</u>, and <u>Approximate Fluid Capacities</u>. Tighten 19-30 (14-22 lb ft)
4	Transfer Case Vent Assembly

FOUR WHEEL DRIVE CLUTCH SHIM SELECTION

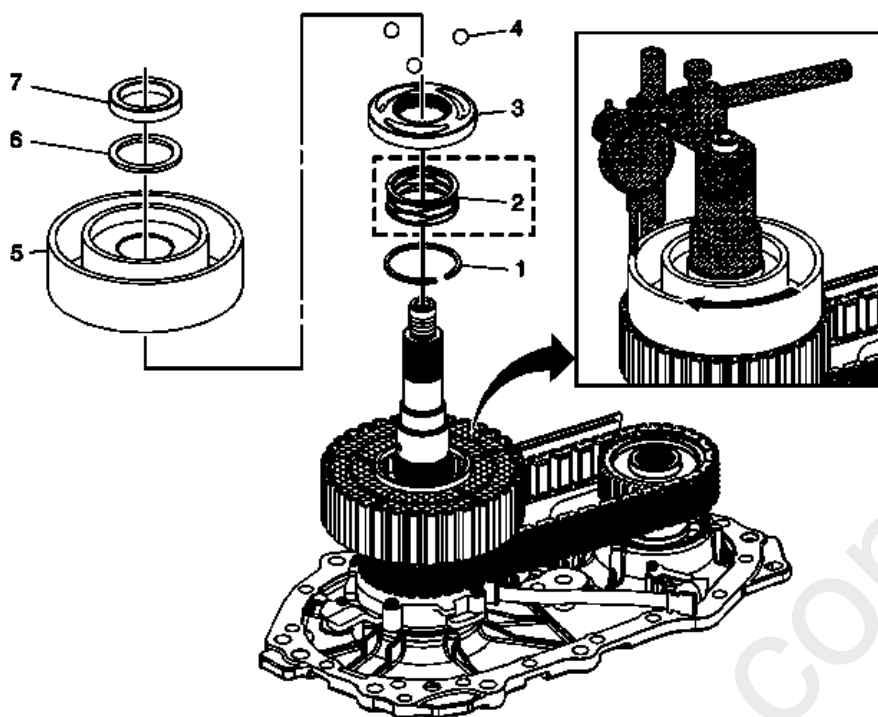


Fig. 55: View Of Four Wheel Drive Clutch Shim Selection
 Courtesy of GENERAL MOTORS COMPANY

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 Transfer Case Assemble in Case Half, and Apply Cam, and Clutch Pack Installation.	
1	Transfer Case Snap Ring
2	Transfer Case Wave Spring Procedure Temporarily remove the spring (2) for selective thrust washer measurement.
3	Transfer Case Apply Cam
4	Transfer Case Balls
5	Transfer Case Rotor Assembly
6	Transfer Case Thrust Bearing
	Transfer Case Selective Thrust Washer
Procedure	
1. Attach, screw, the DT-48553 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 thrust washer selected will create the nominal clutch travel of 0.95 mm (0.0375 in.)
6. The selective thrust washer requires verification before proceeding. Remove the **DT-48553** clutch pack measurement adapter , install the selected thrust washer and re-measure the travel as performed above to obtain a clutch pack travel of 0.7-1.2 mm (0.0275-0.0472 in). Refer to **Spacer and Shim Specifications** for a list of available thrust washer sizes.
7. Remove the **J-8001** dial indicator and the **DT-48553** clutch pack measurement adapter.
8. Disassemble the components to the clutch pack retaining ring (1).
9. Assemble the internal components. Refer to **Transfer Case Assemble**.

Special Tools

- **DT-48553** Clutch Pack Measurement Adapter
- **J-8001** Dial Indicator

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

DESCRIPTION AND OPERATION

TRANSFER CASE DESCRIPTION AND OPERATION

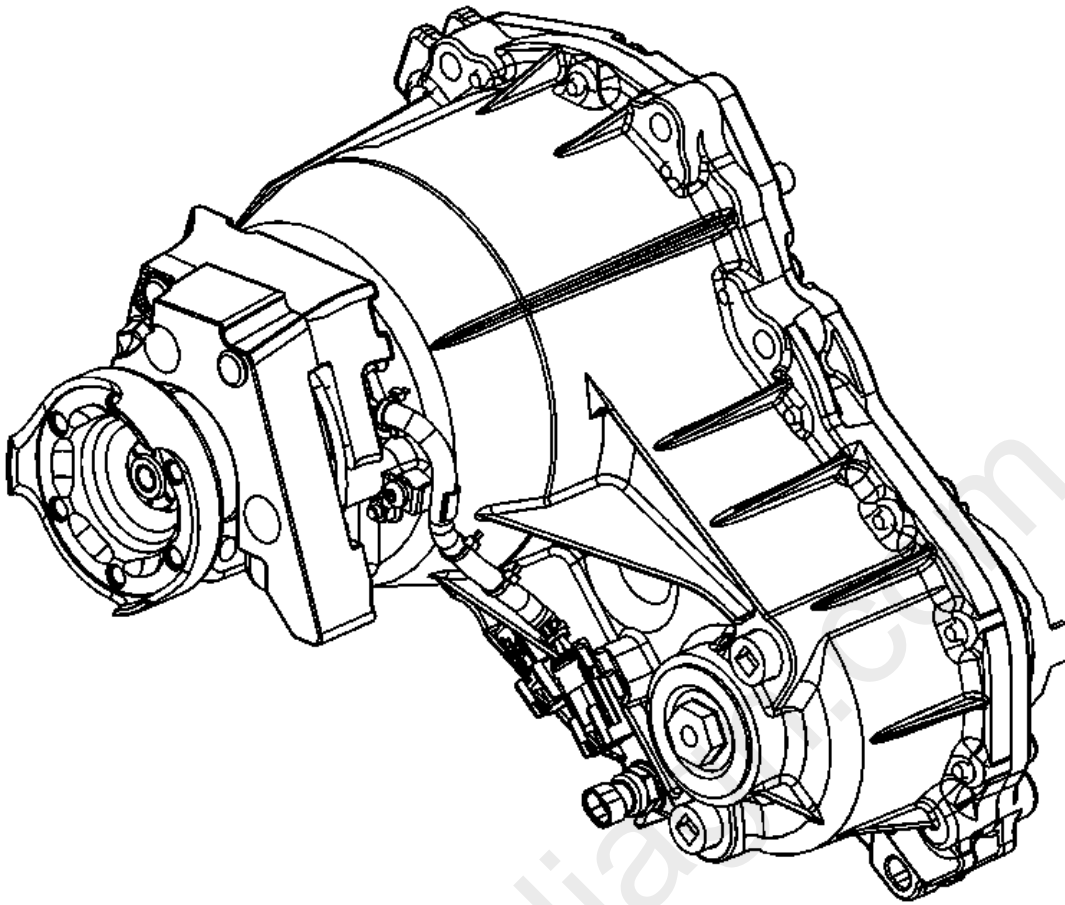


Fig. 56: Transfer Case Description and Operation
Courtesy of GENERAL MOTORS COMPANY

The Borg Warner (BW) model 4477, transfer case power take-off unit (PTU) is a 1-speed active transfer case.

An on demand torque biasing friction clutch is tuned through software calibrations. This allows features such as flexible clutch preload torque levels. This allows for vehicle speed dependent clutch torque levels to enhance system performance. For example, the system is calibrated to provide low clutch torque during low speed, low engine torque operation, and predetermined higher torque at greater speeds. This prevents crow-hop and binding at low speeds and provides higher torque biases at higher vehicle speeds, to enhance stability.

The BW 4477 clutch pack assembly contains a, predetermined selectable pressure plate, friction and reaction plates; serviced as an assembly. The clutch is controlled by pulse width modulated voltage through a coil, ball and cam apply system. Performance variation is reduced further through a selectable external in-line resistor. Matched to clutch system performance, the resistor fine tunes apply rates and maximum front wheel torque outputs. If the clutch pack assembly is replaced, a 12.7 k ohm clutch coil resistor should be used in place of the pre-existing resistor. If the resistor is replaced due to loss or damage without replacing the clutch pack, replace with one of the same resistance and refer to **Transfer Case Clutch Coil Resistor Replacement**.

The BW 4477 case halves are die-cast aluminum. Ball bearings support the input shaft, and front output shaft.

An oil pump, driven by a 1-piece input/output shaft, pumps fluid through the shaft oil gallery for the clutch and bearing lubrication. This transfer case requires specific lubrication. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

The BW 4477 for the GMX226, 2 door coupe, application is designed with a second or additional coast side chain snubber within the assembly.

Borg Warner 4477 Build Variations

The Borg Warner 4477 transfer cases are available in many variations, depending on the vehicle, model year, engine, and transmission configurations. The variations allow the transfer case to handle different torque loads and other requirements. When servicing the transfer case, it is important to understand which variation is being serviced because of the different internal components.

BW 4477 Build Variations

Vehicle Model	Model Year	Transmission	Transmission Output Shaft	Transfer Case Input Shaft	Second Chain Snubber Y/N
Cadillac CTS	2008-2009	MYB and MX7	First Design*	First Design*	N
Cadillac CTS	2010	MYA/MYB and MX7	Second Design**	Second Design**	N
Cadillac CTS 2 Door Coupe	2011 and later	MYB and MX7	Second Design	Second Design	Y
Cadillac CTS Wagon with RPO FE5	2011 and later	MYA/MYB and MX7	Second Design	Second Design	Y
Cadillac CTS Wagon without RPO FE5	2011 and later	MYA/MYB and MX7	Second Design	Second Design	N

*Prior to assembling of the transmission and transfer case, install 2 o-rings onto the first design transmission output shaft. If transfer case input shaft or transfer case assembly replacement is required, second design transmission output shafts and second design transfer case input shafts and assemblies are the only design available for service. Second design shafts do not require installation of the 2 additional o-rings.

**First design transmission outputs and transfer case input shafts are included in 2010 vehicles built prior to 3/11/10.

For all applications, transfer cases with the first design input shafts must be installed to transmissions that have first design output shafts. First design components are not to be used with second design components. Replace both the first design transmission output and transfer case input shafts with second design components as required.

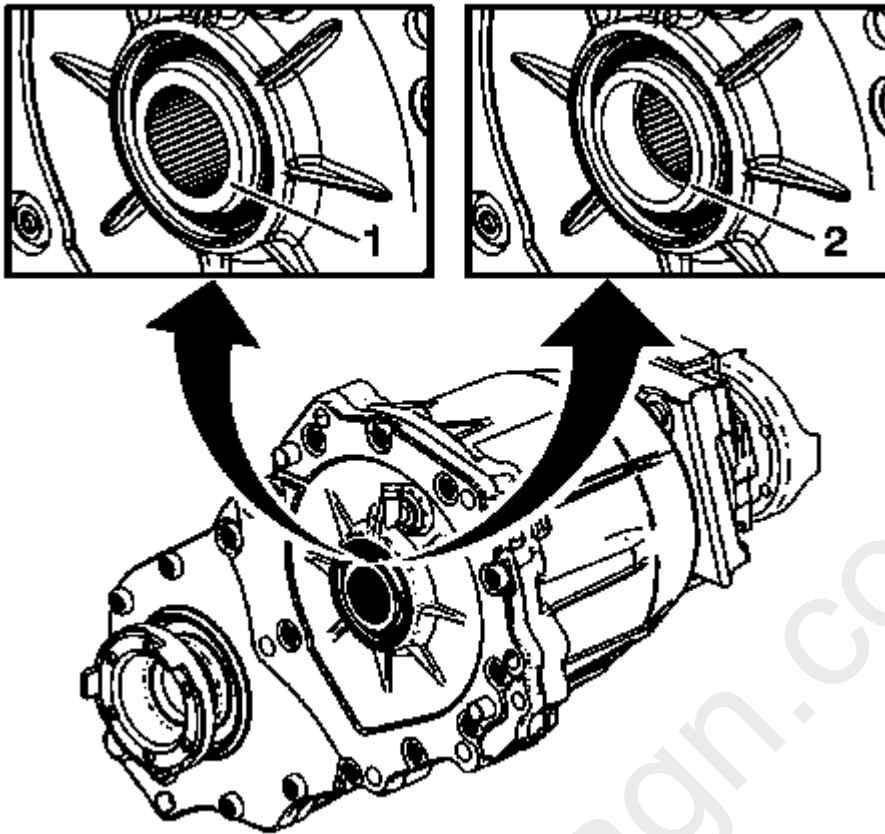


Fig. 57: Identifying Transfer Case Version
Courtesy of GENERAL MOTORS COMPANY

First design transfer case assemblies (1) have input shaft splines the full length of the shaft. Second design assemblies (2) have a machined inside diameter (ID) surface at the opening of the shaft.

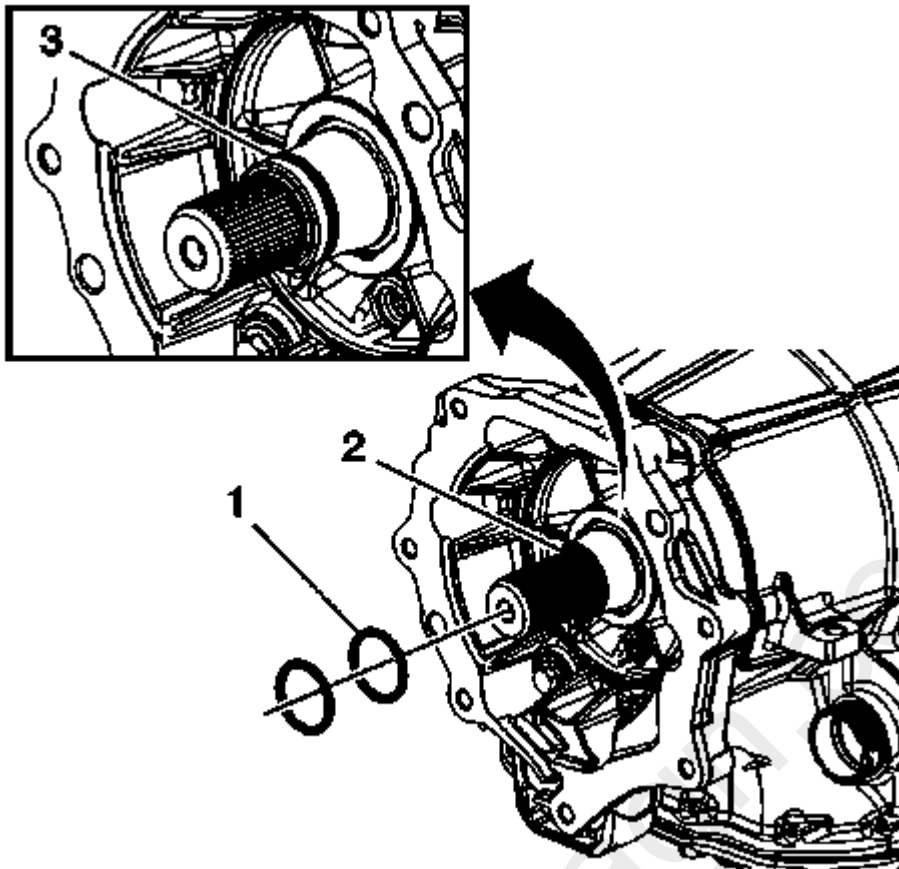


Fig. 58: Identifying First & Second Design O-Ring Installation
Courtesy of GENERAL MOTORS COMPANY

First design AWD 5/6 speed transmissions, RPOs MV3/MX5/MYA and MYB, can be identified as not having an o-ring and o-ring ring groove at the inner area of the splines. Second design output shafts can be identified by the o-ring (3) located in the groove of the shaft.

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 Design Change - Transmission Output Shaft and Transfer Case Input Shaft

Interim 2010 model year, a new design transmission output shaft and transfer case input shaft were implemented into production. Refer to the information below for the appropriate service strategy.

Vehicle Model	Model Year	Transmission	Transmission Output Shaft	Transfer Case Input Shaft	Second Chain Snubber Y/N
Cadillac CTS	2008-2009	MYB and MX7	First Design*	First Design*	N
Cadillac CTS	2010	MYA/MYB and MX7	Second Design**	Second Design**	N
Cadillac CTS 2 Door Coupe	2011 and later	MYB and MX7	Second Design	Second Design	Y
Cadillac CTS Wagon with RPO FE5	2011 and later	MYA/MYB and MX7	Second Design	Second Design	Y
Cadillac CTS Wagon without RPO FE5	2011 and later	MYA/MYB and MX7	Second Design	Second Design	N
*Prior to assembling of the transmission and transfer case, install 2 o-rings onto the first design transmission output shaft. If transfer case input shaft or transfer case assembly replacement is required, second design transmission output shafts and second design transfer case input shafts and assemblies are the only design available for service. Second design shafts do not require installation of the 2 additional o-rings.					
**First design transmission outputs and transfer case input shafts are included in 2010 vehicles built prior to 3/11/10.					
For all applications, transfer cases with the first design input shafts must be installed to transmissions that have first design output shafts. First design components are not to be used with second design components. Replace both the first design transmission output and transfer case input shafts with second design components as required.					

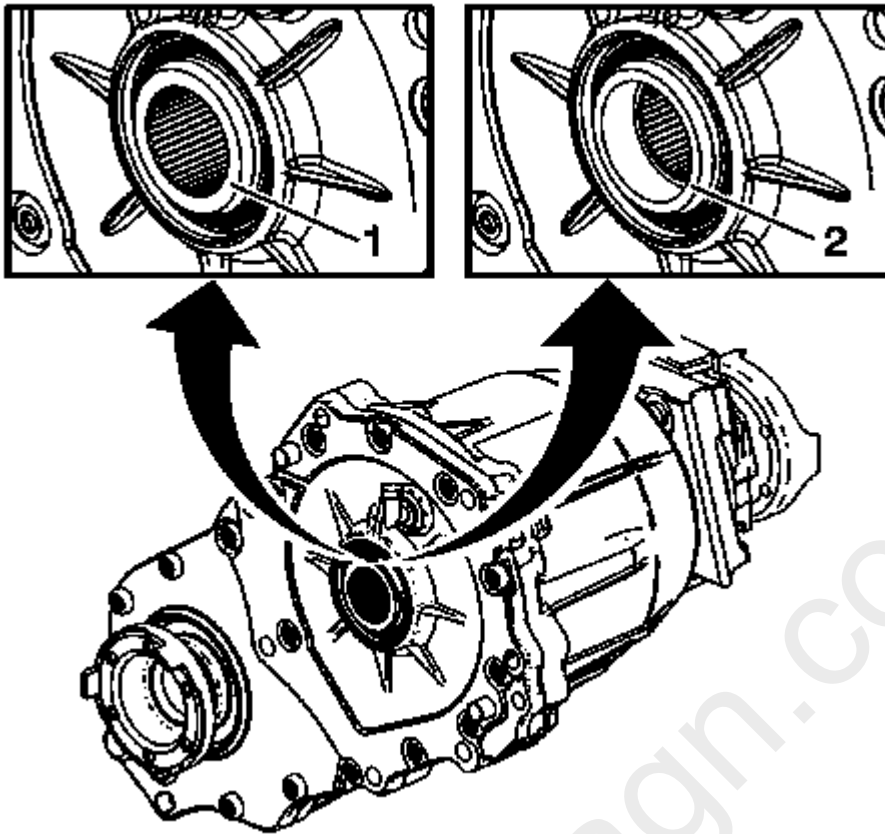


Fig. 59: Identifying Transfer Case Version
Courtesy of GENERAL MOTORS COMPANY

First design transfer case assemblies (1) have input shaft splines the full length of the shaft. Second design assemblies (2) have a machined inside diameter (ID) surface at the opening of the shaft.

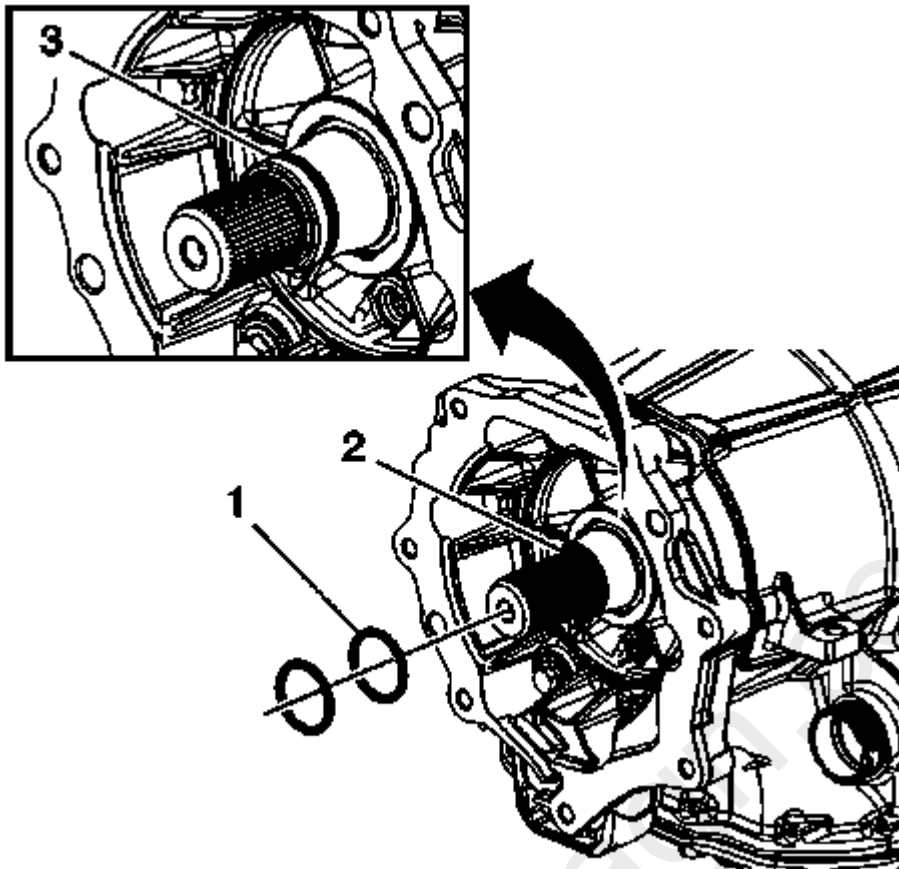


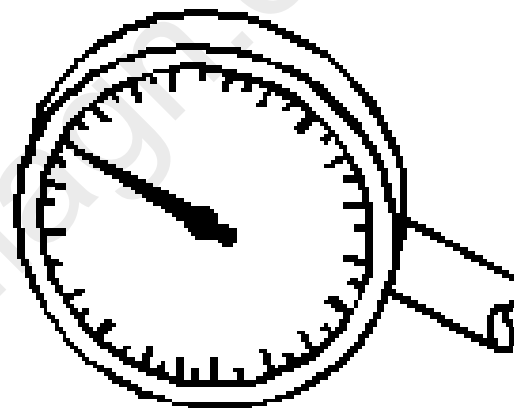
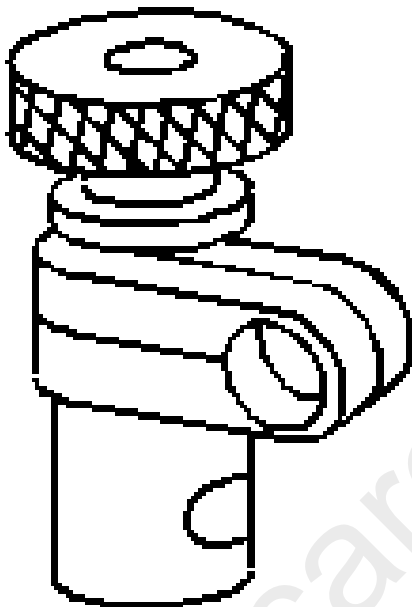
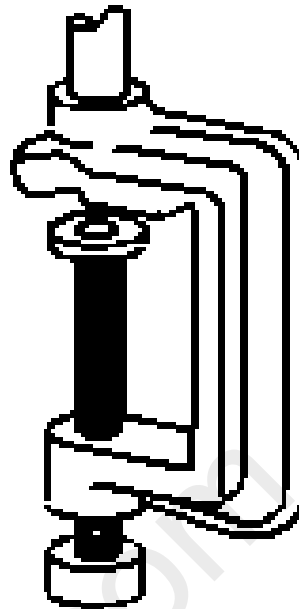
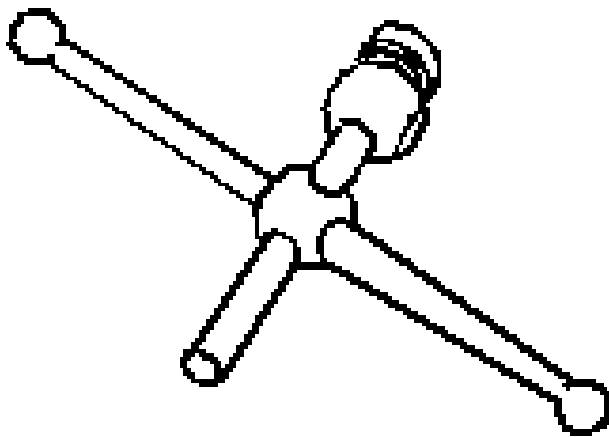
Fig. 60: Identifying First & Second Design Output Shafts
 Courtesy of GENERAL MOTORS COMPANY

First design AWD 5/6 speed transmissions, RPOs MV3/MX5/MYA and MYB, can be identified as not having an o-ring and o-ring ring groove at the inner area of the splines. Second design output shafts can be identified by the o-ring (3) located in the groove of the shaft.

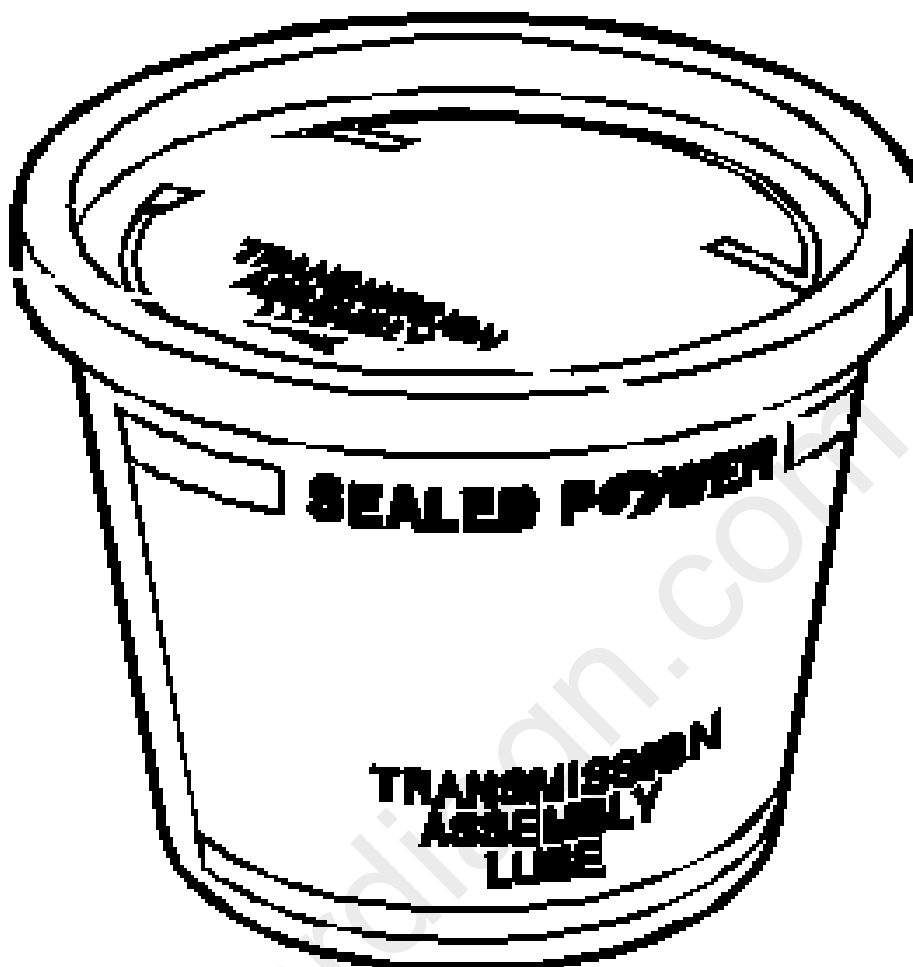
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

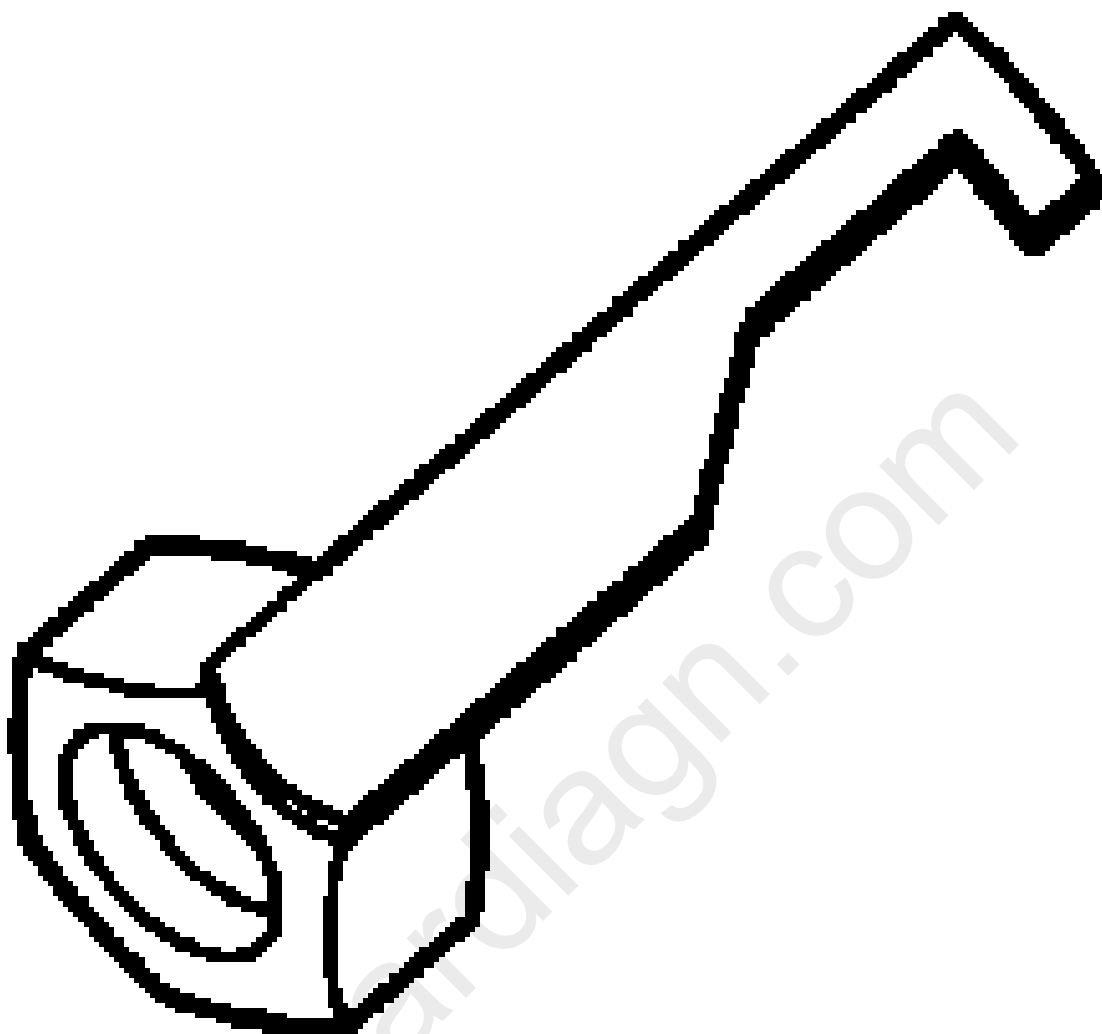
Illustration	Tool Number/Descrip



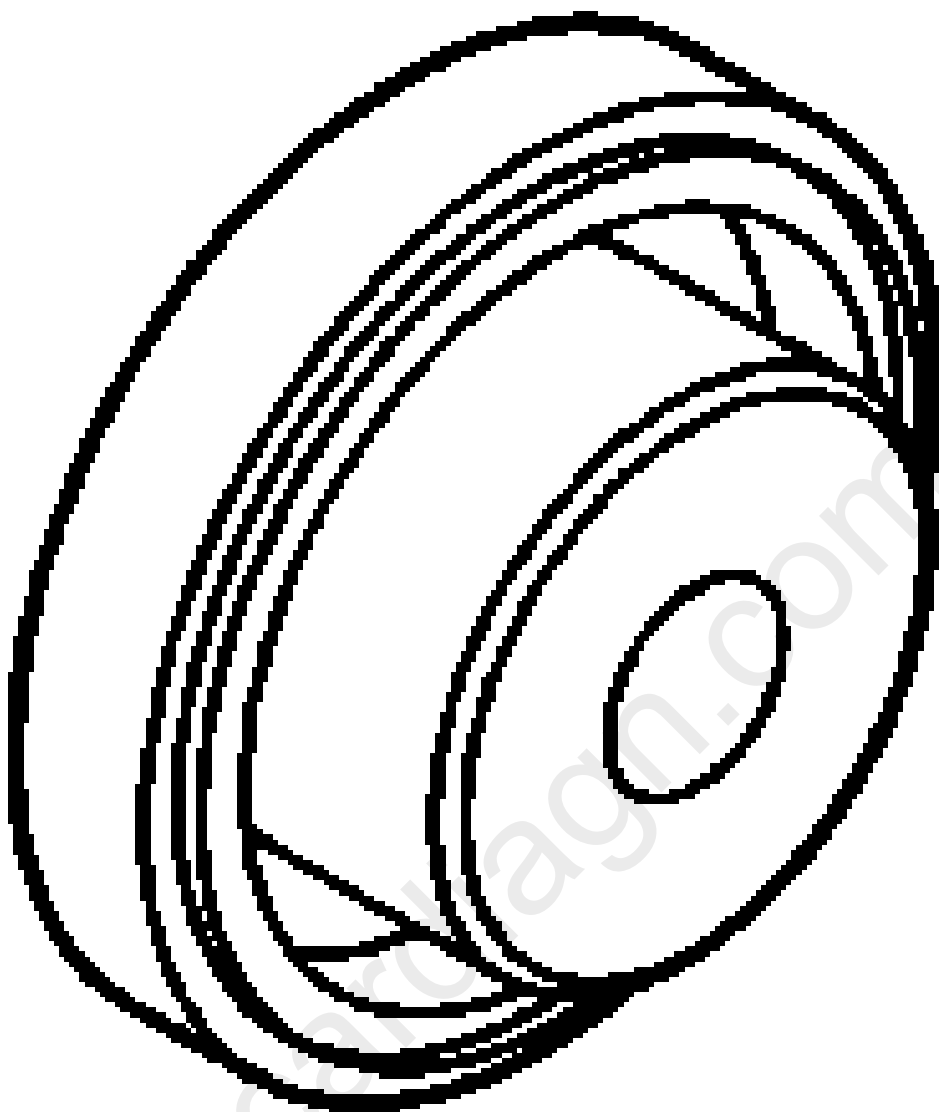
DT-8001
J-8001
Dial Indicator S



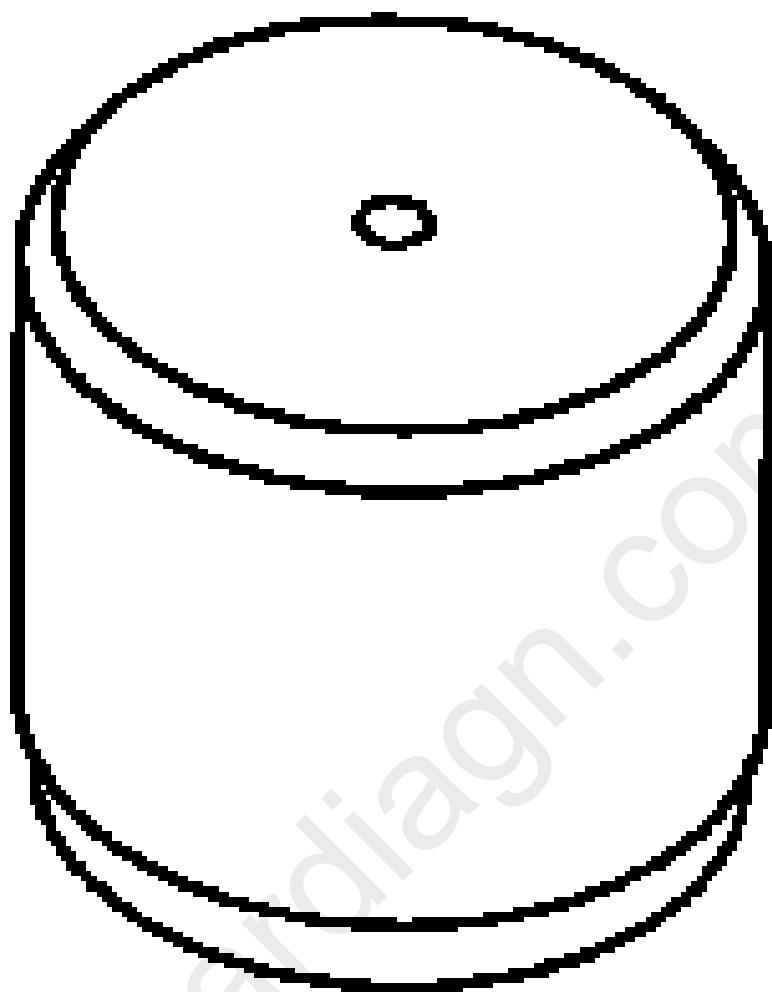
DT-36850
J 36850
Transjell Lubricants



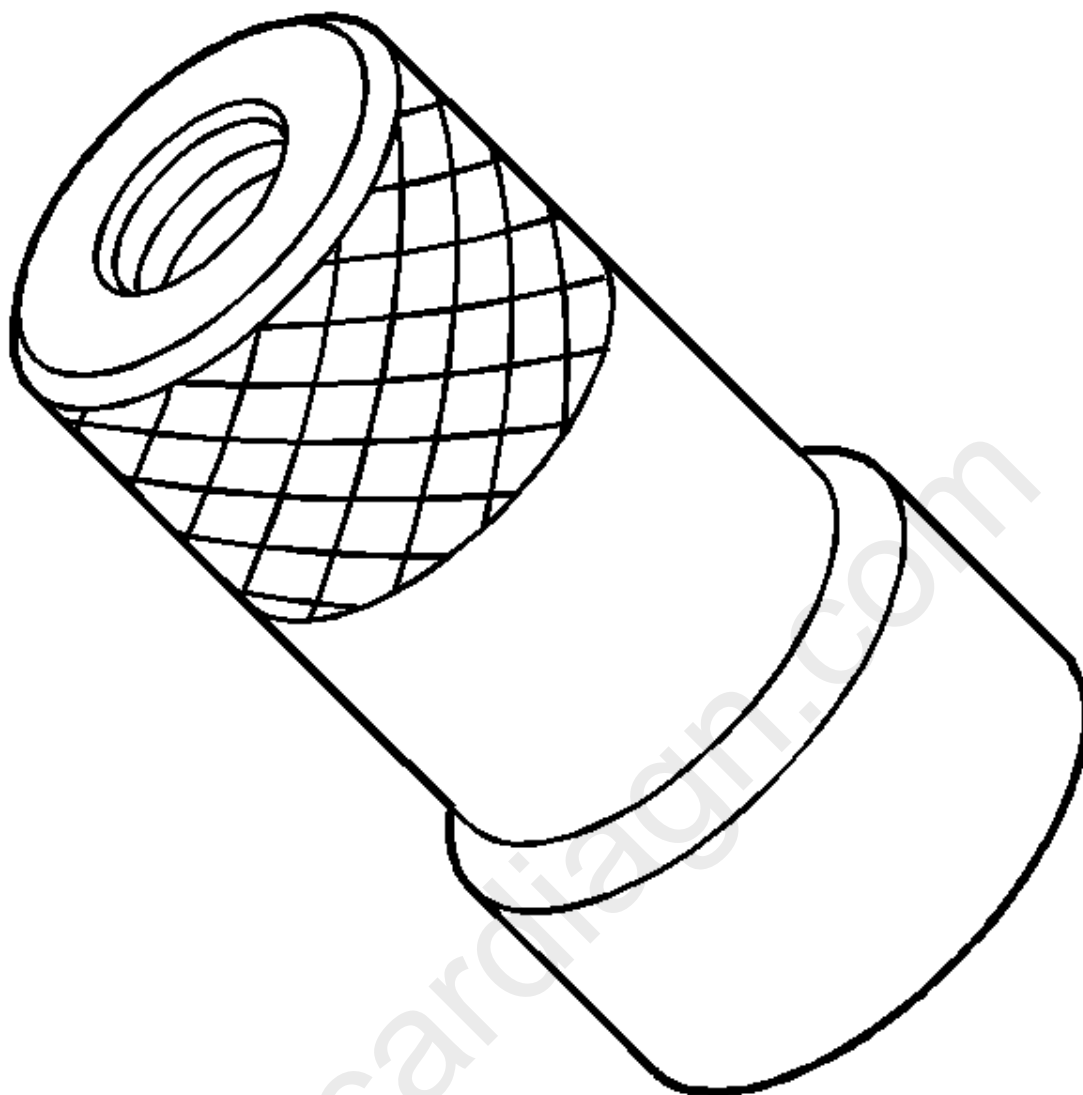
DT-45278
J-45278
Seal Remover



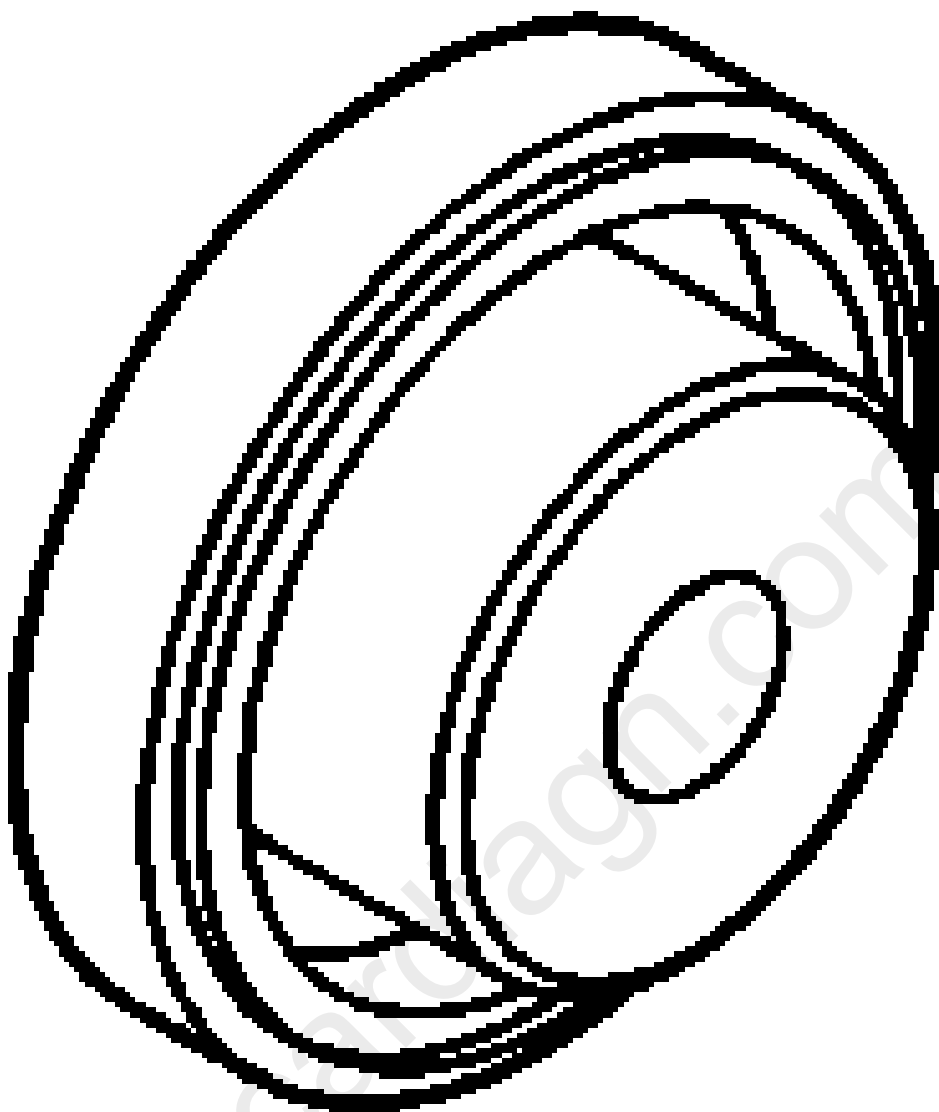
DT-46268
J-46268
Output Seal Insta



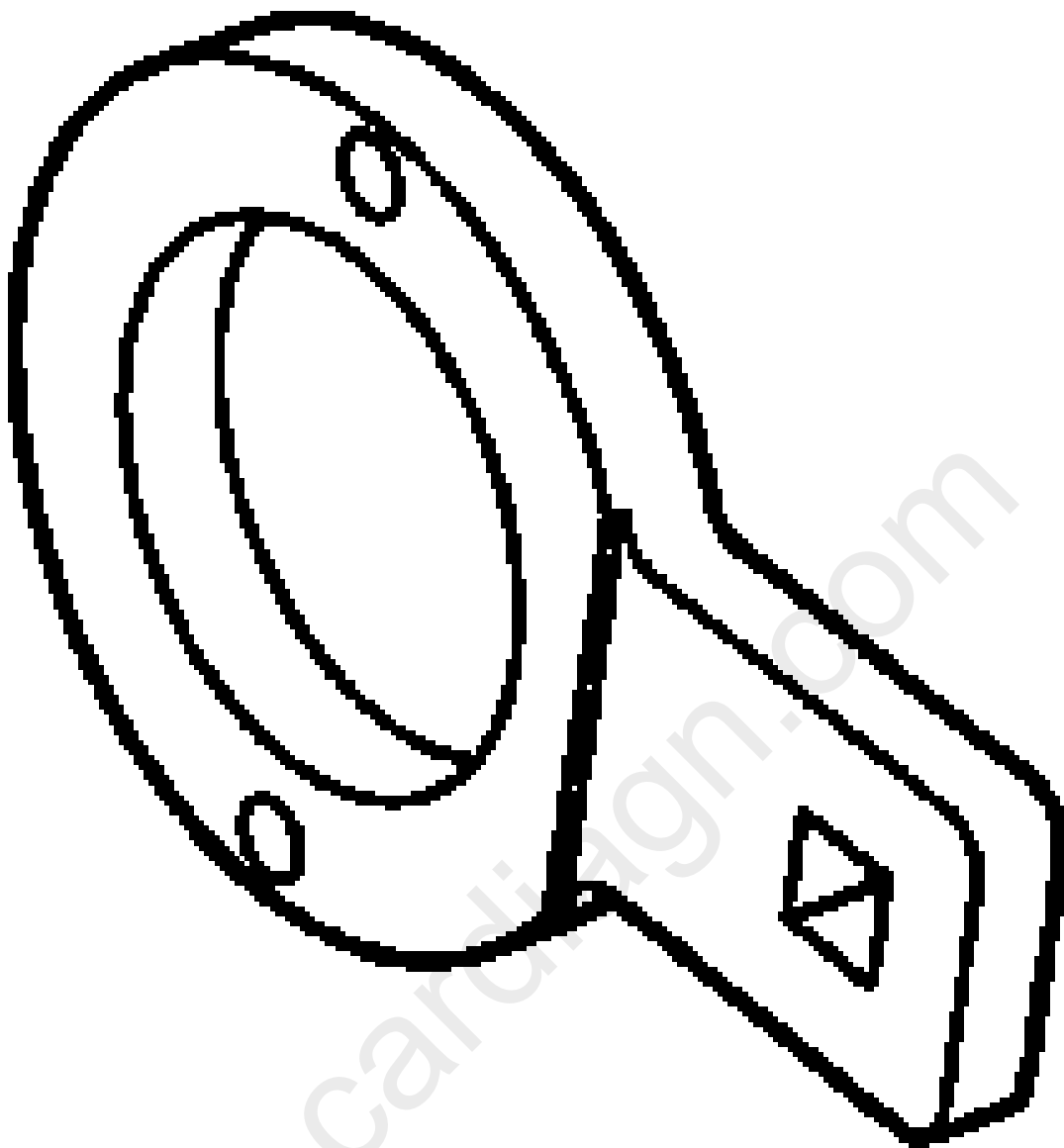
DT-47928-1
Rear Seal Instal



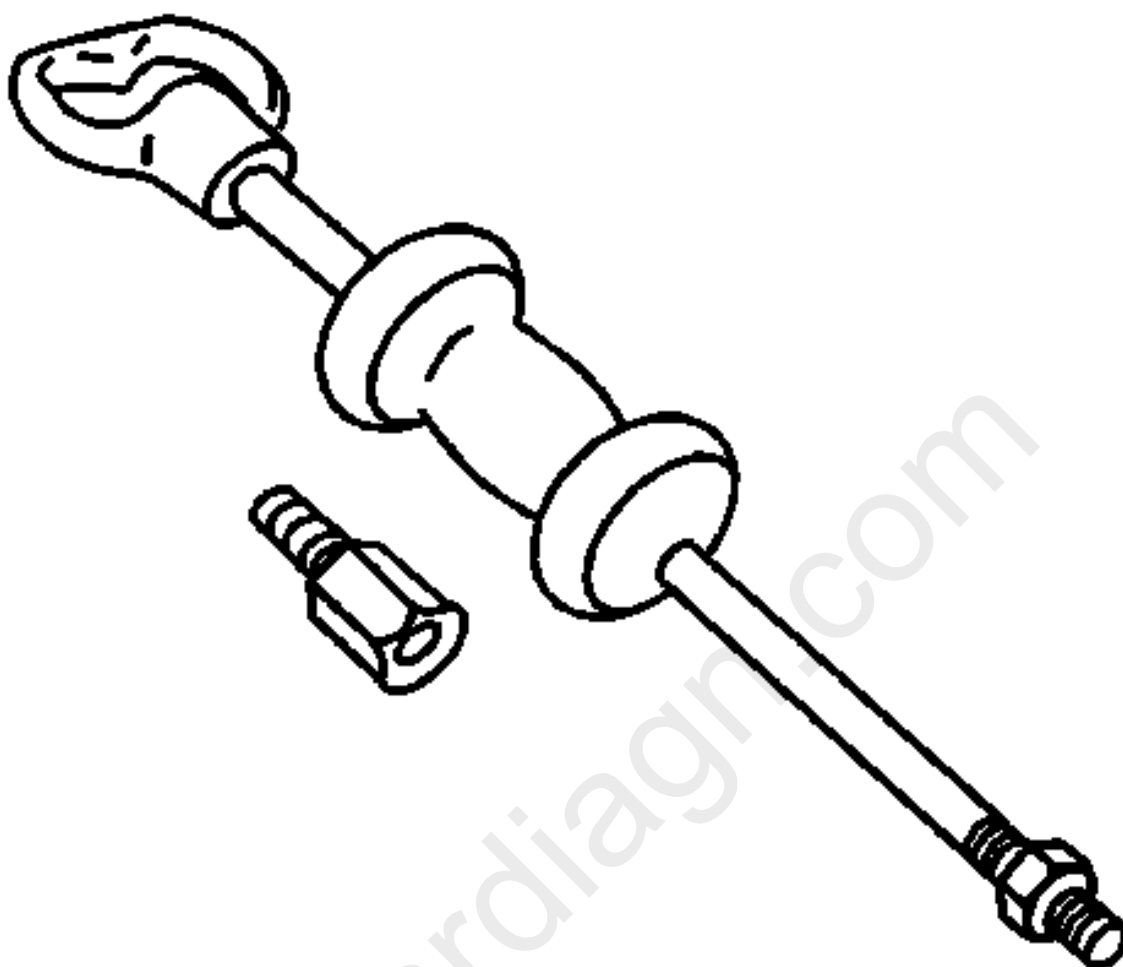
DT-48553
Clutch Pack
Measurement
Adapter



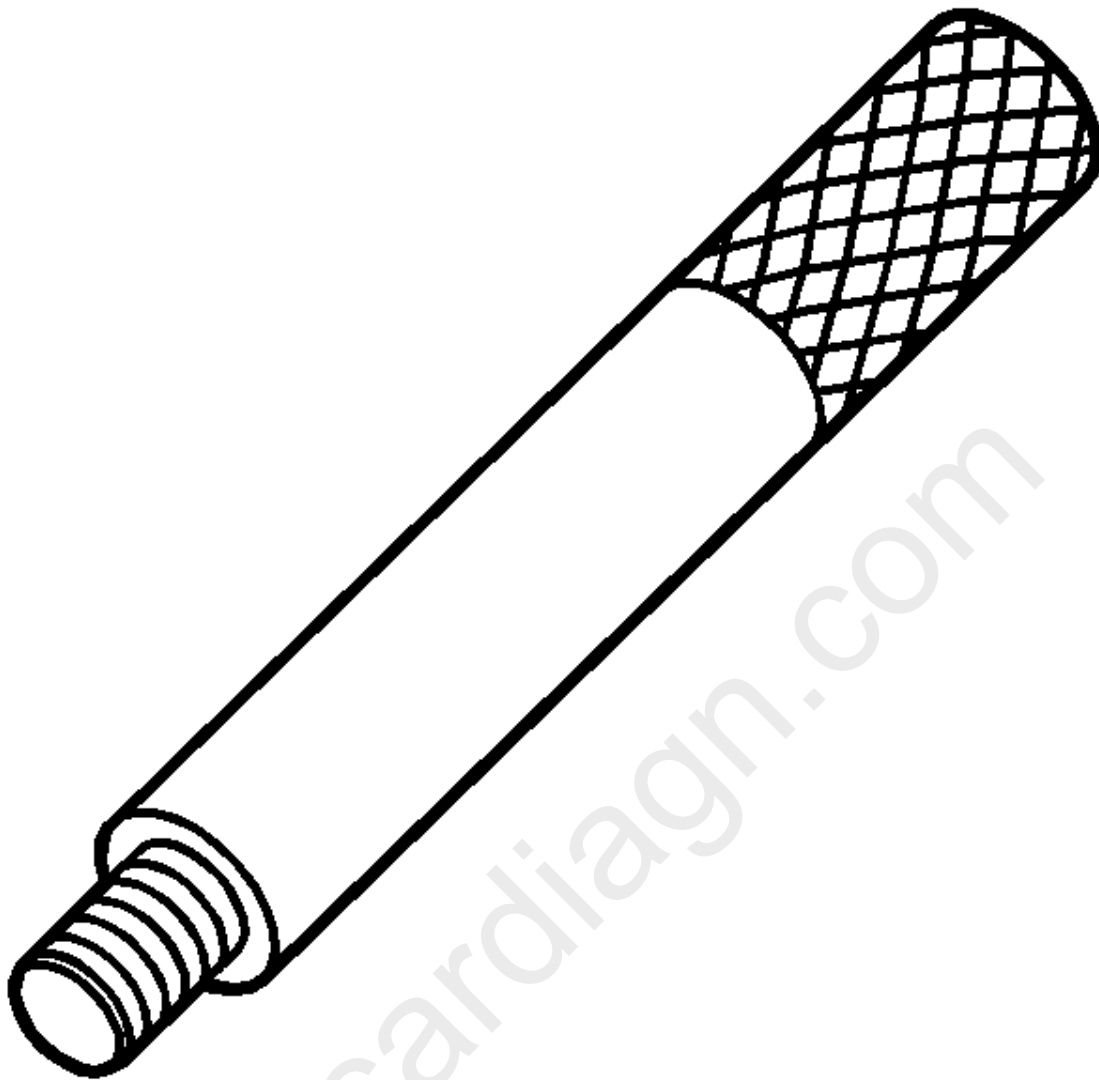
DT-48846
Output Seal Insta



DT-48847
Pinion Flange Ho



GE-02619-A
J-02619-A
Slide Hammer
w/Adapter



GE-8092
J-8092
Driver Handle