

2004 DRIVELINE/AXLE

Transfer Case - MJ8 - Vue

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Cover Bolts	26 N.m	20 lb ft
Drain Plug	44 N.m	33 lb ft
Fill Plug	44 N.m	33 lb ft
Output Shaft/Yoke Locknut - Tighten the Nut Within the Specification Range to Achieve the Proper Output Shaft Rotating Torque	108-294 N.m	75.6-217 lb ft
Output Yoke-to- J 44873 Retaining Bolts	48 N.m	35 lb ft
Propeller Shaft-to-Transfer Case Output Yoke Bolts	25 N.m	19 lb ft
Transfer Case-to-Transmission Bolts	51 N.m	38 lb ft
Ventilation Baffle Bolt	11.8 N.m	104 lb in

TRANSFER CASE MECHANICAL SPECIFICATIONS

Transfer Case Mechanical Specifications

Application	Specification	
	Metric	English
Output Shaft and Input Gear Backlash	0.06-0.16 mm	0.0024-0.0063 in
Output Shaft Rotating Torque	1.15-1.71 N.m	10.2-15.1 lb in
Output Shaft/Input Gear Rotating Torque - Measured With the Unit Assembled	3.20-4.16 N.m	28.2-34.3 lb in
Transfer Case Fill Quantity - Overhaul of Unit	0.45 Liters	0.48 quarts
Transfer Case Fill Quantity - Replacement of Unit	0.43 Liters	0.45 quarts
Transmission Type - RPO MJ8	5-Speed Automatic	

SEALERS, ADHESIVES, AND LUBRICANTS

Sealers, Adhesives, and Lubricants

Application	Type of Material	GM Part Number	
		United States	Canada
Transfer Case Lubricant	Hypoid Gear Oil	12378261	10953455

COMPONENT LOCATOR

TRANSFER CASE DISASSEMBLED VIEW

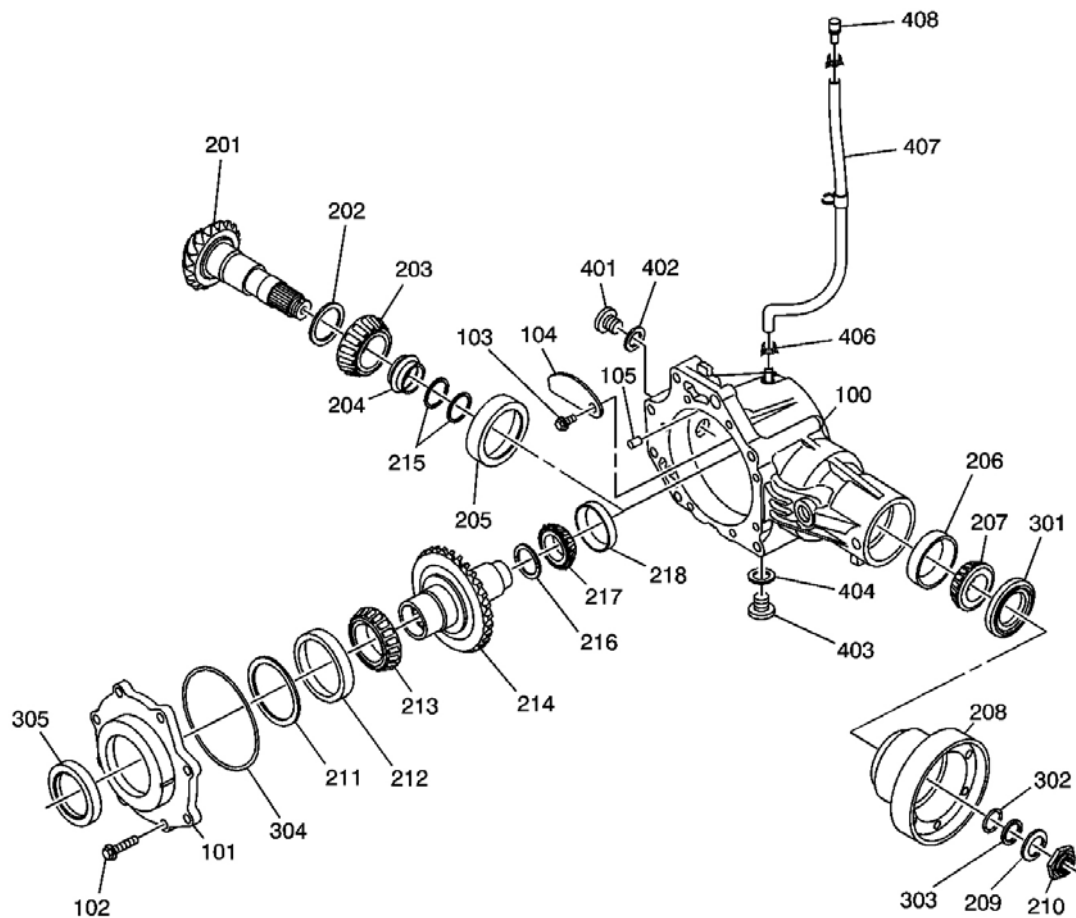


Fig. 1: Transfer Case Disassembled View
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1 Disassembled View

Callout	Component Name
100	Case
101	Cover
102	Bolt
103	Bolt
104	Ventilation Baffle
105	Locating Pin - Transfer Case-to-Transaxle
201	Output Shaft

202	Shim - 40 mm
203	Bearing
204	Spacer
205	Race
206	Race
207	Bearing
208	Output Yoke
209	Washer
210	Nut
211	Shim - 80 mm
212	Race
213	Bearing
214	Input Gear
215	Washer
216	Shim - 25 mm
217	Bearing
218	Race
301	Seal - Output Shaft
302	O-Ring
303	Sealing Washer
304	O-Ring
305	Seal - Input Shaft
401	Fill Plug
402	Washer
403	Drain Plug
404	Washer
406	Clamp
407	Ventilation Hose
408	Ventilation Valve

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - TRANSFER CASE

Begin the system diagnosis by reviewing the **Transfer Case Disassembled View** and the **Transfer Case Description and Operation** . Reviewing the description and operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the description and operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Transfer Case** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

SYMPTOMS - TRANSFER CASE

Strategy Based Diagnostics

Review the system operations in order to familiarize yourself with the system functions. Refer to **Transfer Case Disassembled View** and **Transfer Case Description and Operation** . All diagnosis on a vehicle should follow a logical process. Strategy based diagnostics is a uniform approach for repairing all systems. The diagnostic flow may always be used in order to resolve a system condition. The diagnostic flow is the place to start when repairs are necessary. For a detailed explanation, refer to **Strategy Based Diagnosis** in General Information.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the vehicle. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Check for the correct lubricant levels and the proper viscosities.
- Verify the exact operating conditions under which the concern exists. Note factors such as vehicle speed, road conditions, ambient temperature, and other specifics.
- Compare the driving characteristics or sounds, if applicable, to a known good vehicle and ensure you are not trying to correct a normal condition.

Intermittent

Test the vehicle under the same conditions that the customer reported in order to verify the system is operating properly.

Symptom List

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

- **Diagnostic Starting Point - Vibration Diagnosis and Correction** in Vibration Diagnosis and Correction
- **Diagnostic Starting Point - Transfer Case**
- **Diagnostic Starting Point - Rear Drive Axle** in Rear Drive Axle
- **Diagnostic Starting Point - Wheel Drive Shafts** in Wheel Drive Shafts
- **Diagnostic Starting Point - Propeller Shaft** in Propeller Shaft
- **Noisy in Drive**
- **Noisy When Coasting**
- **Intermittent Noise**
- **Constant Noise**
- **Transfer Case Leak Diagnosis**

NOISY IN DRIVE

Noisy in Drive

Cause	Correction
Inspect for the proper transaxle and gear oil levels prior to performing system diagnosis. Refer to <u>Transfer Case Fluid Drain and Fill</u> .	
Loose propeller shaft mounting bolts	Tighten the bolts as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Worn propeller shaft constant velocity and/or universal joints	Replace components as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Worn or loose propeller shaft center support bearing	Replace components as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Worn axle shaft constant velocity joints	Replace the constant velocity joints as required.
Loose rear differential mounts or worn bushings	Tighten the mount bolts or replace as required.
Incorrect oil in the transfer case	Replace with GM P/N 12378261 (Canadian P/N 10953455).
Bearing noise within the transfer case A "grinding" or "roar" type noise will increase or decrease relative to the vehicle speed.	<ol style="list-style-type: none">1. Check for the proper fluid level. Fill as required.2. If the noise continues, repair or replace the transfer case as required.
Gear set "whine" noise within the transfer case "Whine" type noises will increase or decrease relative to the vehicle speed.	<ol style="list-style-type: none">1. Check for the proper fluid level. Fill as required.2. If the noise continues, replace the transfer case as required. <p>Contributing factors may include:</p> <ul style="list-style-type: none">• Incorrect backlash between the gear set• Worn or damaged gear teeth• Transaxle assembly noise• Differential noise

NOISY WHEN COASTING

Noisy When Coasting

Cause	Correction
Inspect for the proper transaxle and gear oil levels prior to performing system diagnosis. Refer to <u>Transfer Case Fluid Drain and Fill</u> .	
Loose propeller shaft mounting bolts	Tighten the bolts as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Worn propeller shaft universal joints	Replace components as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Worn or loose propeller shaft center support bearing	Replace components as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Worn axle shaft constant velocity joints	Replace the constant velocity joints as required.

Loose rear differential mounts or worn bushings	Tighten the mount bolts or replace as required.
Incorrect oil in the transfer case	Replace with GM P/N 12378261 (Canadian P/N 10953455).
Bearing noise within the transfer case A "grinding" or "roar" type noise will increase or decrease relative to the vehicle speed.	<ol style="list-style-type: none"> 1. Check for the proper fluid level. Fill as required. 2. If the noise continues, replace the transfer case as required.
Gear set "whine" noise within the transfer case "Whine" type noises will increase or decrease relative to the vehicle speed.	<ol style="list-style-type: none"> 1. Check for the proper fluid level. Fill as required. 2. If the noise continues, replace the transfer case as required. <p>Contributing factors may include:</p> <ul style="list-style-type: none"> • Incorrect backlash between the gear set • Worn or damaged gear teeth • Transaxle assembly noise • Differential noise

INTERMITTENT NOISE

Intermittent Noise

Cause	Correction
Inspect for the proper transaxle and gear oil levels prior to performing system diagnosis. Refer to <u>Transfer Case Fluid Drain and Fill</u> .	
Loose propeller shaft mounting bolts	Tighten the bolts as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Incorrect gear oil	Replace with GM P/N 12378261 (Canadian P/N 10953455).

CONSTANT NOISE

Constant Noise

Cause	Correction
Inspect for the proper transaxle and gear oil levels prior to performing system diagnosis. Refer to <u>Transfer Case Fluid Drain and Fill</u> .	
Low gear oil levels	Faulty oil seals or other type external leaks may contribute to lower than required fluid levels. Refer to <u>Transfer Case Leak Diagnosis</u> . Fill to proper level with GM P/N 12378261 (Canadian P/N 10953455).
Worn propeller shaft universal joints	Repair the propeller shaft as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Worn or loose propeller shaft center support bearing	Replace components as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.

<p>Bearing noise within the transfer case A "grinding" or "roar" type noise will increase or decrease relative to the vehicle speed.</p>	<ol style="list-style-type: none"> 1. Check for the proper fluid level. Fill as required. 2. If the noise continues, replace the transfer case as required.
<p>Gear set "whine" noise within the transfer case A "whine" type noise will increase or decrease relative to the vehicle speed.</p>	<ol style="list-style-type: none"> 1. Check for the proper fluid level. Fill as required. 2. If the noise continues, replace the transfer case as required. <p>Contributing factors may include:</p> <ul style="list-style-type: none"> • Incorrect backlash between the gear set • Worn or damaged gear teeth • Transaxle assembly noise • Rear differential noise

TRANSFER CASE LEAK DIAGNOSIS

Transfer Case Leak Diagnosis

Cause	Correction
Restricted or damaged ventilation valve or hose	Repair or replace as required.
Worn, scored, or missing drain and/or fill plug sealing washers	Install new sealing washers and tighten the plugs per specifications.
Worn or damaged input or output shaft oil seals	Replace the oil seals as required.
Cut or damaged side cover O-ring seal	Replace the O-ring seal as required.
Case or cover porosity or leaking seal surfaces	Replace the transfer case as required.

REPAIR INSTRUCTIONS

TRANSFER CASE FLUID DRAIN AND FILL

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

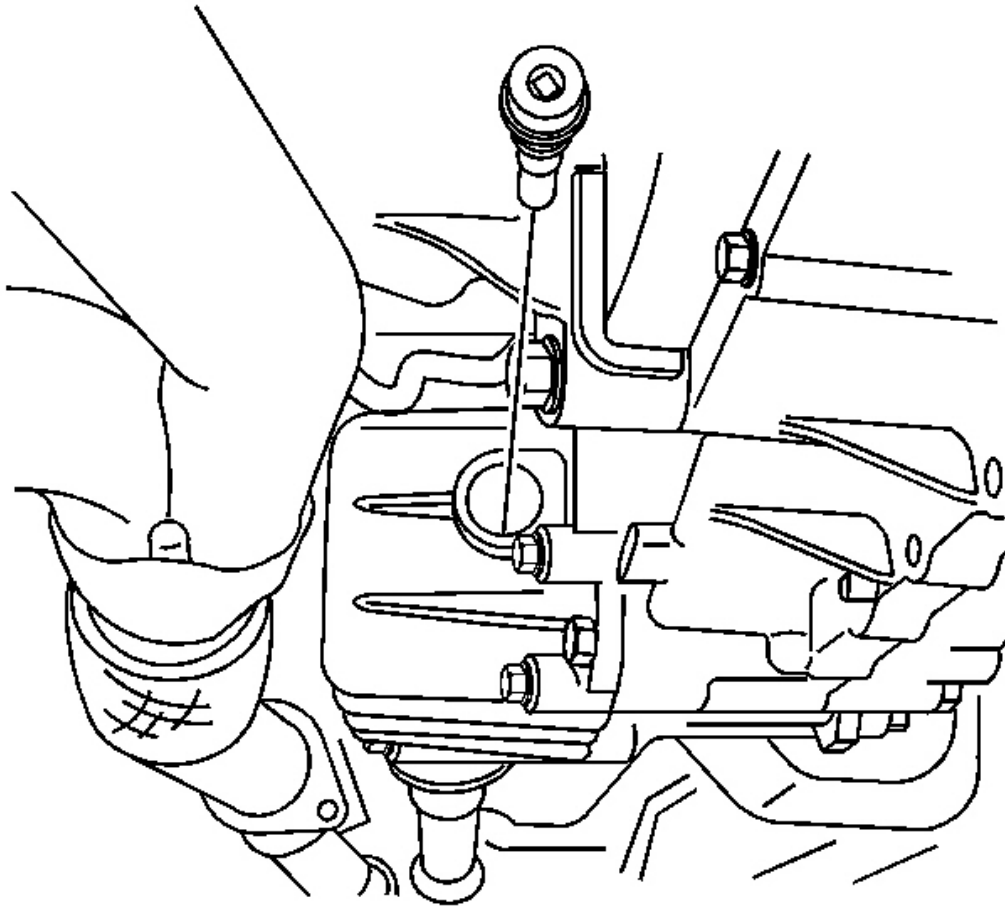


Fig. 2: Transfer Case Check Plug
Courtesy of GENERAL MOTORS CORP.

2. Remove the fill plug and gasket.
3. Place a container under the drain plug in order to catch the oil.

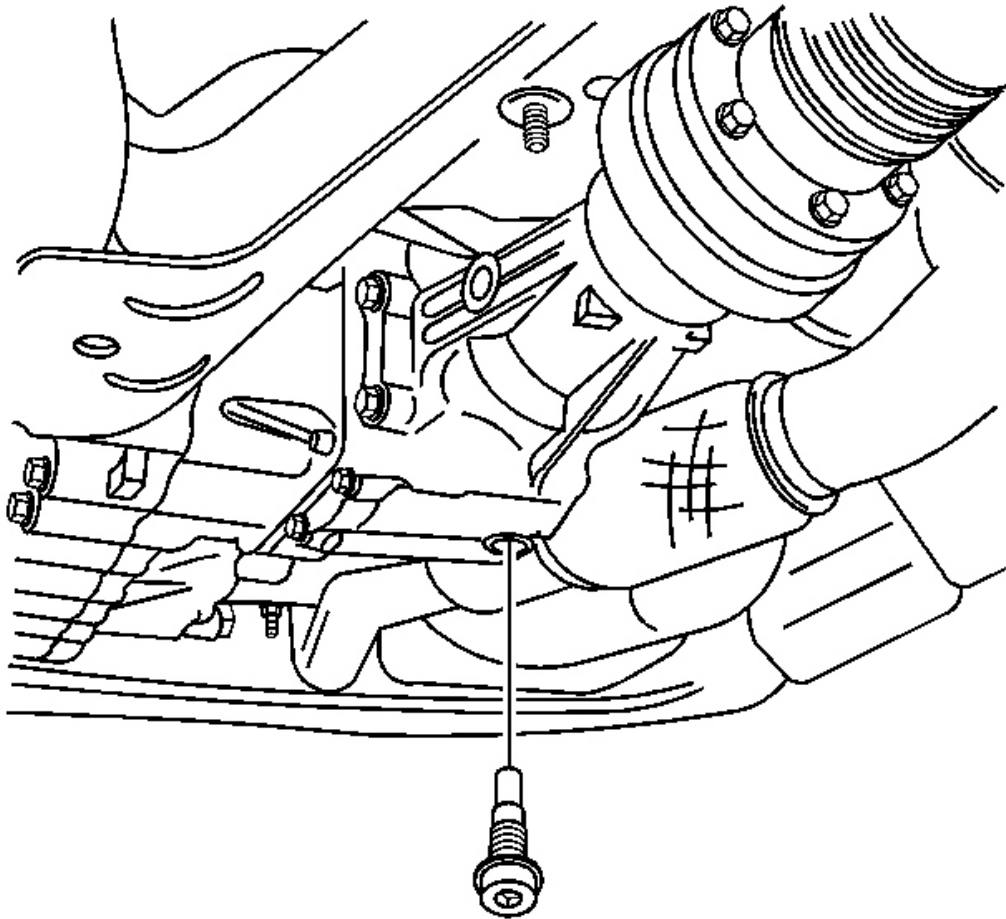


Fig. 3: Removing/Installing Drain Plug & Gasket
Courtesy of GENERAL MOTORS CORP.

4. Remove the drain plug and gasket. Allow the oil to drain.

Installation Procedure

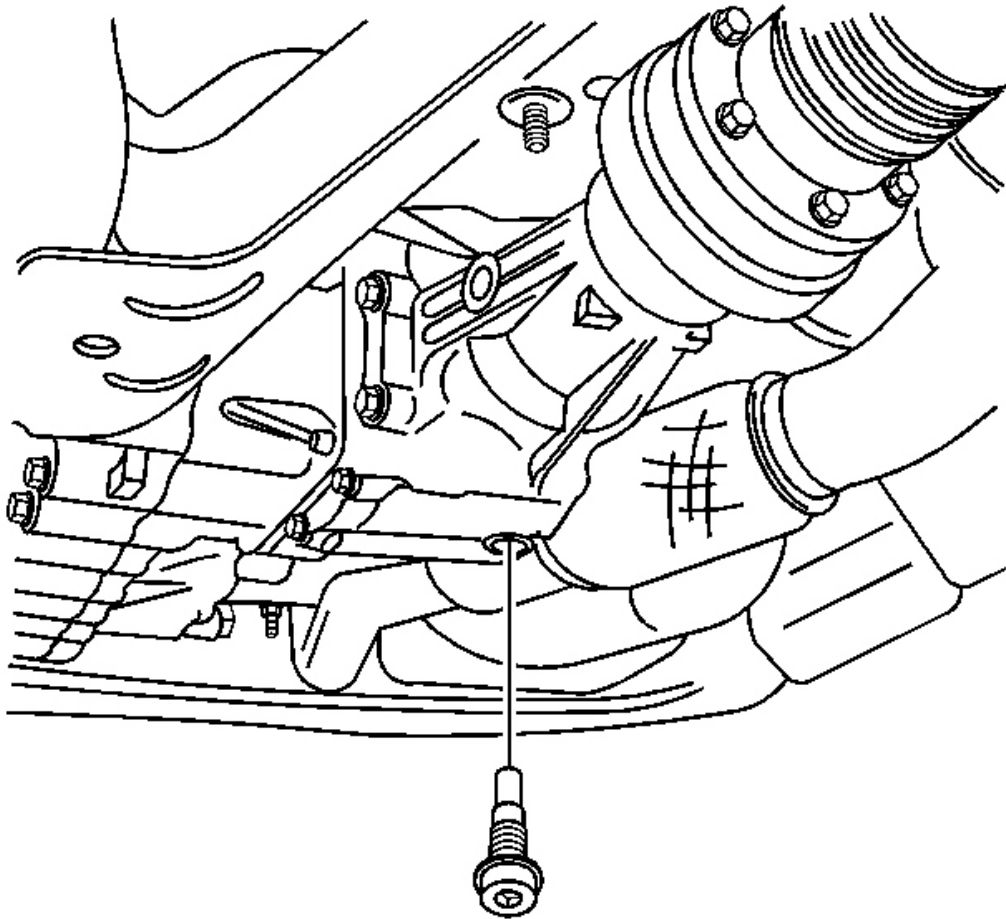


Fig. 4: Removing/Installing Drain Plug & Gasket
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the drain plug and gasket.

Tighten: Tighten the drain plug to 44 N.m (33 lb ft).

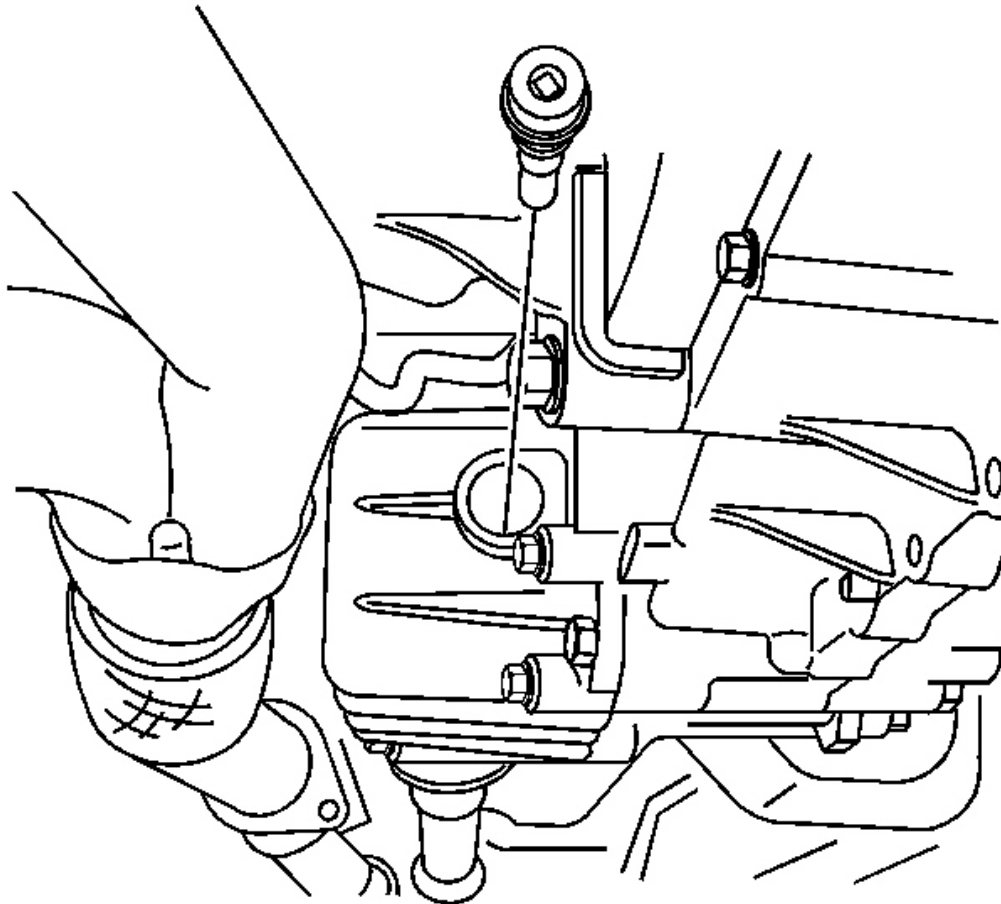


Fig. 5: Transfer Case Check Plug
Courtesy of GENERAL MOTORS CORP.

2. Fill the transfer case with synthetic gear oil GM P/N 12378261. Refer to **Capacities - Approximate Fluid** in General Information.
3. Fill the transfer case to the bottom of the oil fill plug hole.
4. Install the oil fill plug and gasket.

Tighten: Tighten the oil fill plug to 44 N.m (33 lb ft).

5. Lower the vehicle.

TRANSFER CASE REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the propeller shaft. Refer to **Propeller Shaft Replacement** in Propeller Shaft.

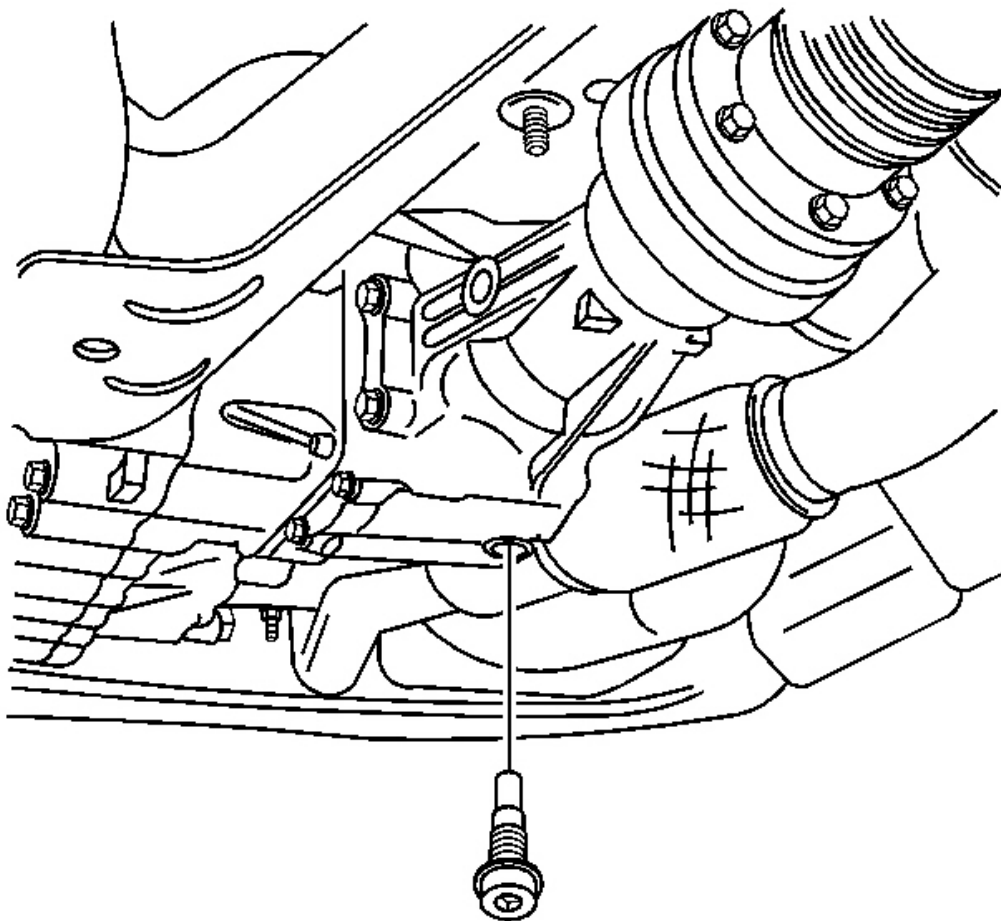


Fig. 6: Removing/Installing Drain Plug & Gasket
Courtesy of GENERAL MOTORS CORP.

3. Remove the drain plug to drain the transfer case oil.
4. Remove the exhaust crossunder pipe. Refer to **Exhaust Manifold Pipe Replacement (L66)** or **Exhaust Manifold Pipe Replacement (L61)** in Engine Exhaust.

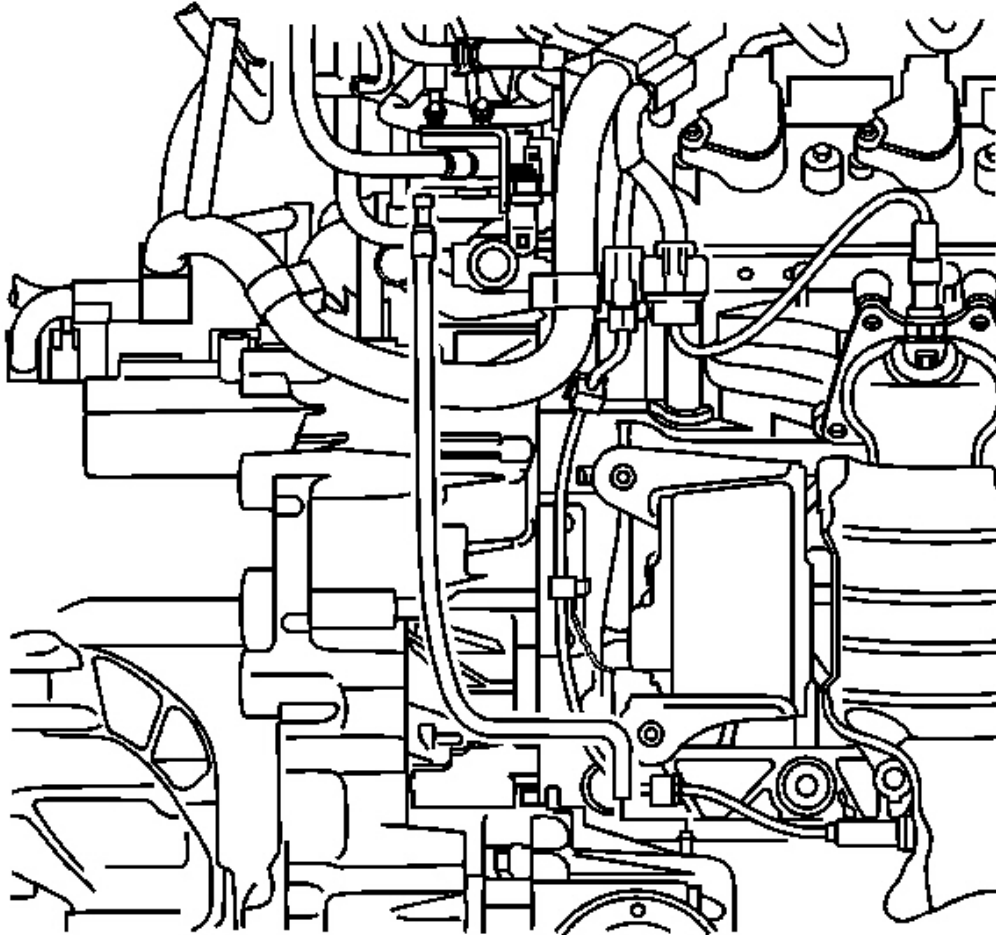


Fig. 7: Removing/Installing Vent Hose From The Transfer Case Assembly
Courtesy of GENERAL MOTORS CORP.

5. Remove the vent tube clamp.
6. Remove the vent tube from the transfer case.

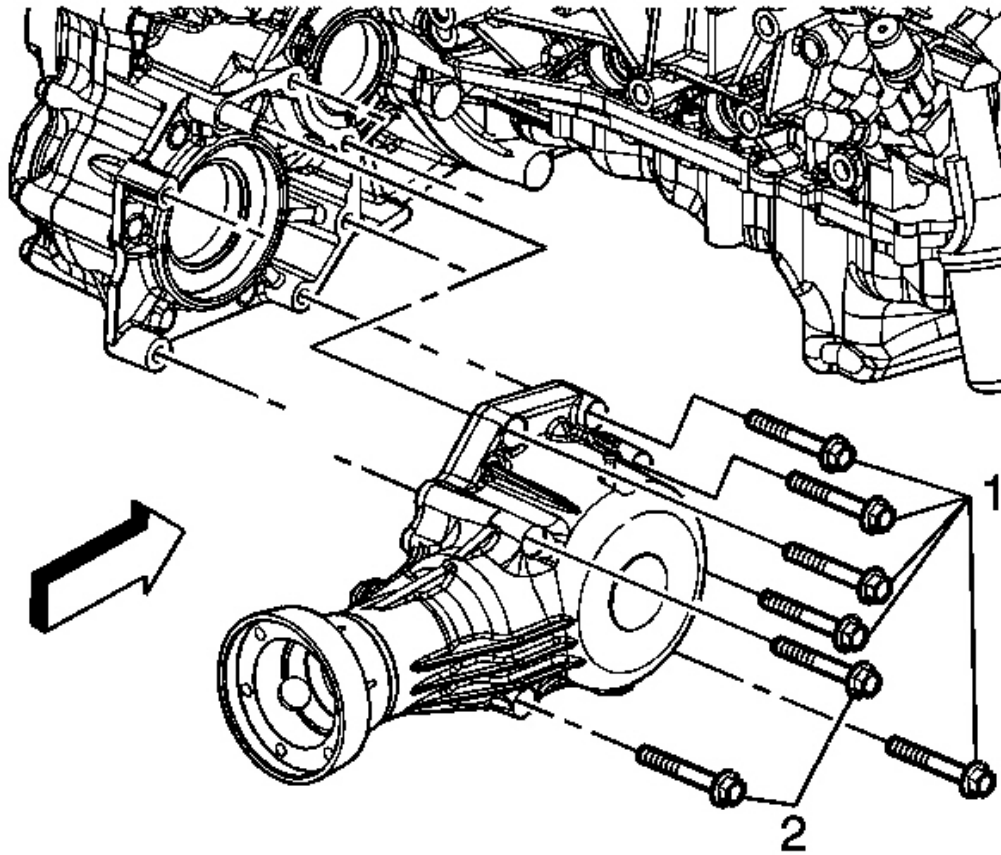


Fig. 8: Removing/Installing Transfer Case
Courtesy of GENERAL MOTORS CORP.

7. Remove the transfer case.

NOTE: During removal of the transfer case/output shaft, do not use excessive force or damage to the bushings may occur.

8. Remove the transfer case from the transaxle.

Installation Procedure

1. Install the transfer case to the transaxle.

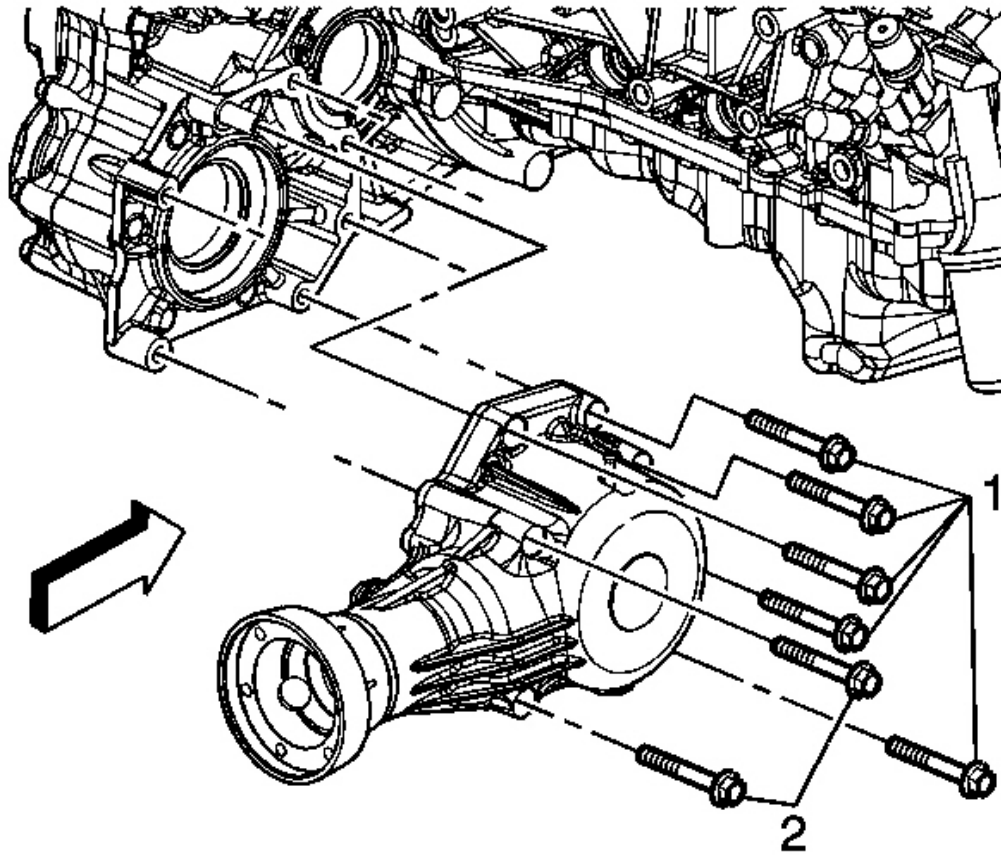


Fig. 9: Removing/Installing Transfer Case
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the transfer case bolts.

Tighten: Tighten the bolts to 51 N.m (38 lb ft).

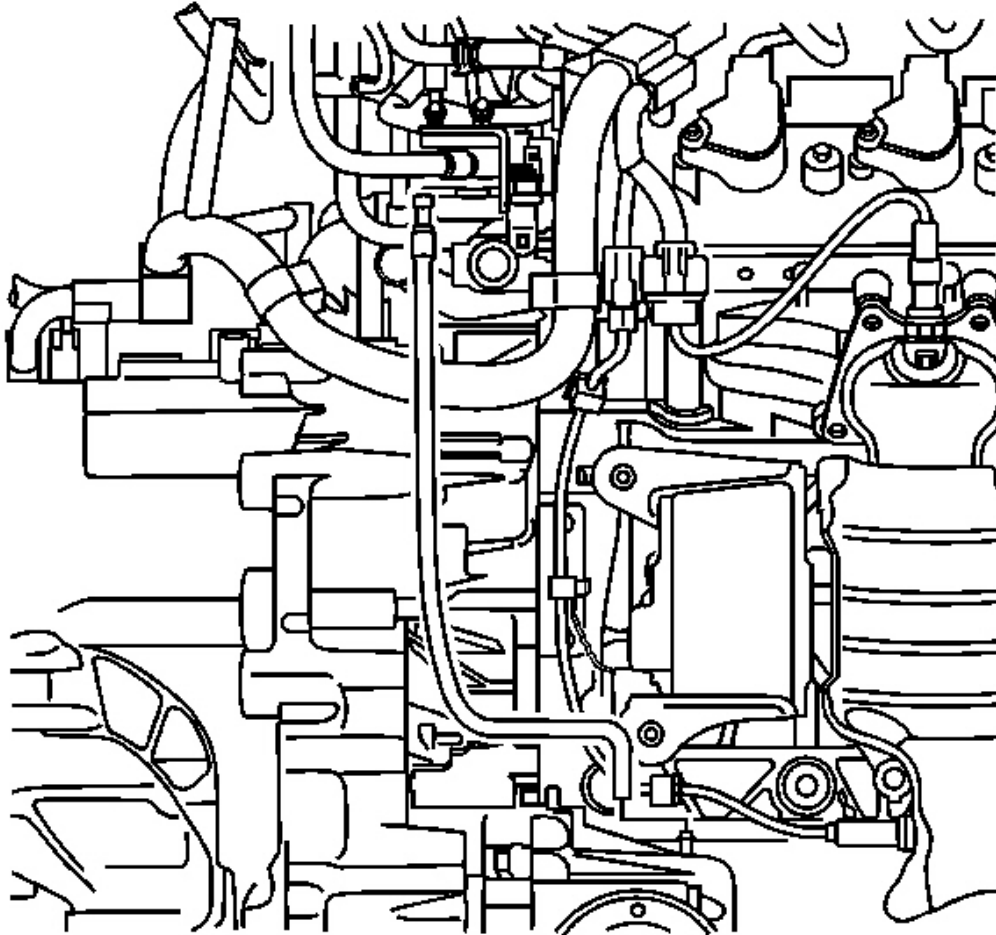


Fig. 10: Removing/Installing Vent Hose From The Transfer Case Assembly
Courtesy of GENERAL MOTORS CORP.

3. Install the vent hose and the clamp to the transfer case.
4. Install the exhaust crossunder pipe. Refer to **Exhaust Manifold Pipe Replacement (L66)** or **Exhaust Manifold Pipe Replacement (L61)** in Engine Exhaust.
5. Install the propeller shaft. Refer to **Propeller Shaft Replacement** in Propeller Shaft.

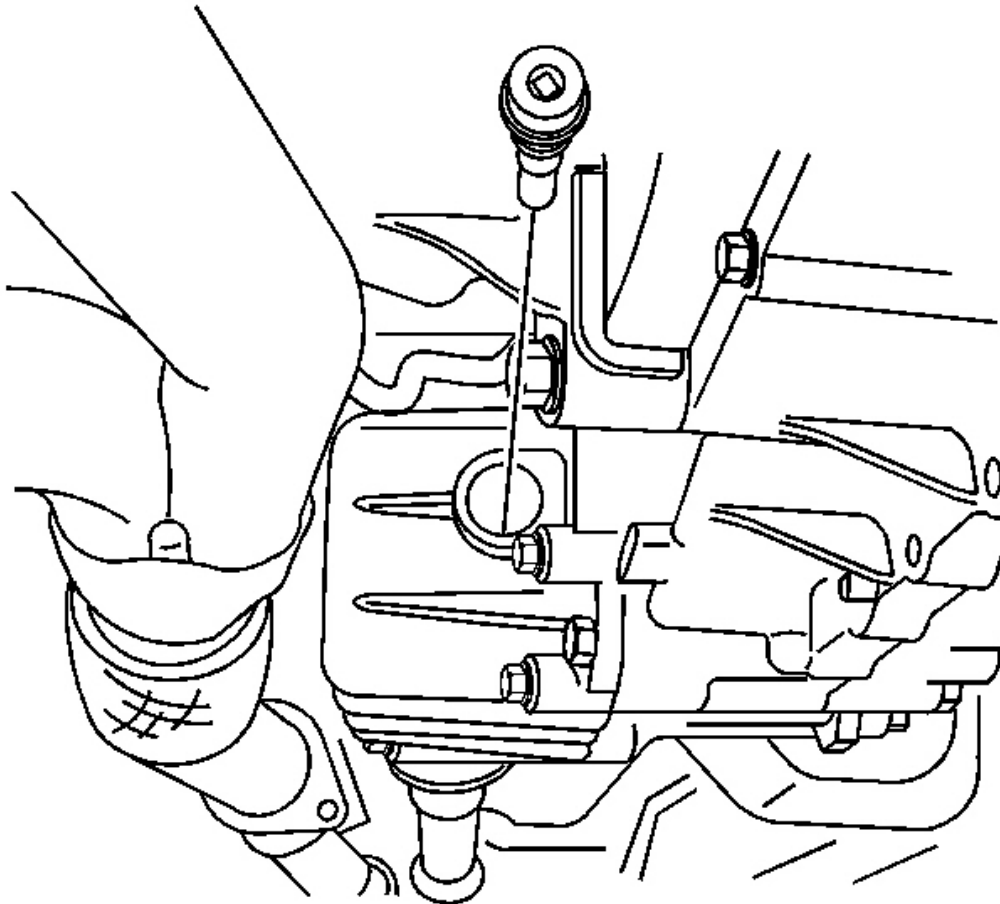


Fig. 11: Transfer Case Check Plug
Courtesy of GENERAL MOTORS CORP.

6. Remove the transfer case check plug and fill the transfer case with the specified synthetic gear oil. Refer to Transfer Case Fluid Drain and Fill .
7. Install the check plug and gasket to the case.

Tighten: Tighten the check plug to 44 N.m (33 lb ft).

8. Lower the vehicle.

TRANSFER CASE VENT HOSE REPLACEMENT

Removal Procedure

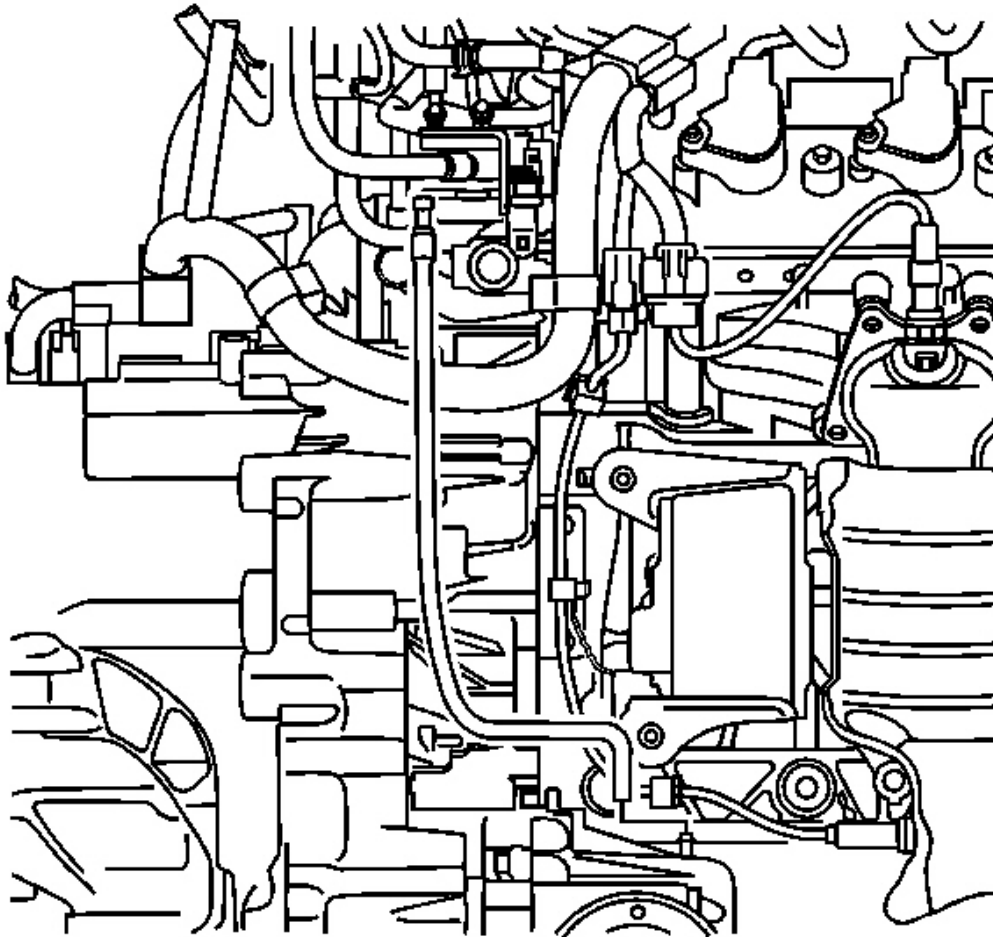


Fig. 12: Removing/Installing Vent Hose From The Transfer Case Assembly
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Release the vent hose clamp from the transfer case assembly.
3. Remove the vent hose from the transfer case assembly.

Installation Procedure

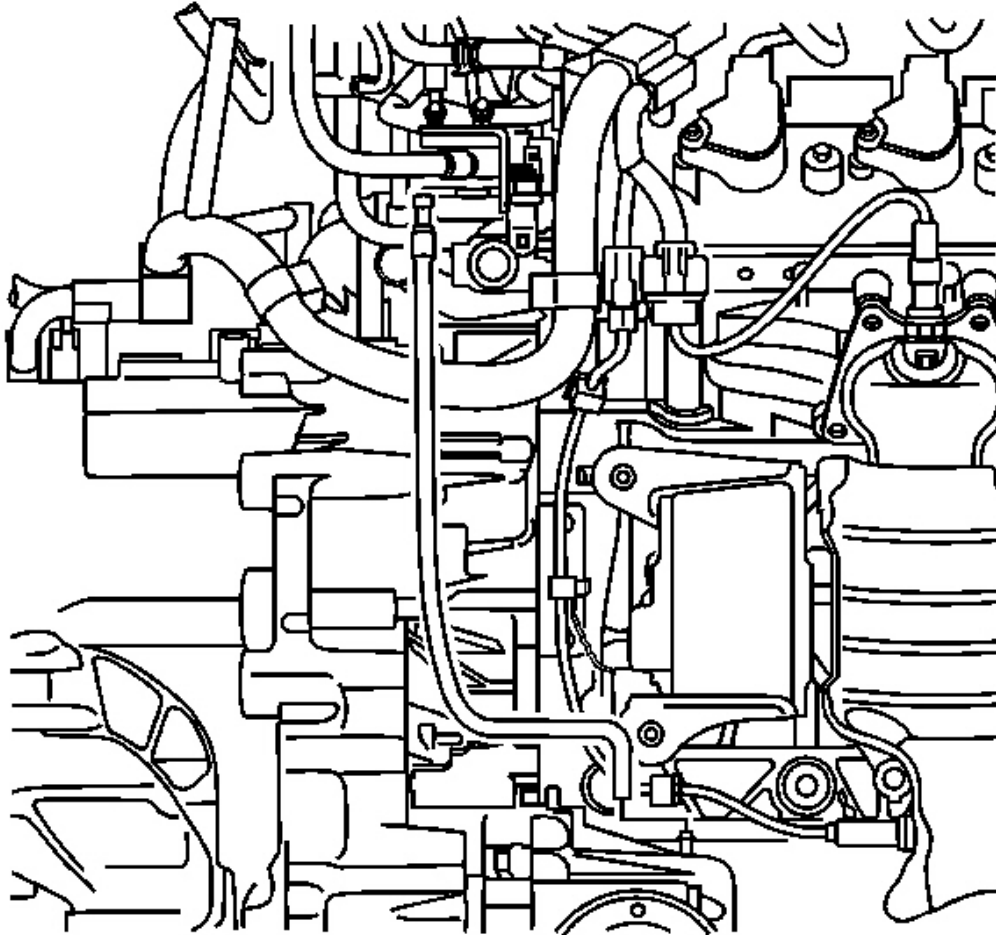


Fig. 13: Removing/Installing Vent Hose From The Transfer Case Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the vent hose to the transfer case assembly.
2. Install the vent hose clamp to the transfer case assembly.
3. Lower the vehicle.

TRANSFER CASE DISASSEMBLE

Tools Required

J 44873 Pinion Flange Holder and Remover

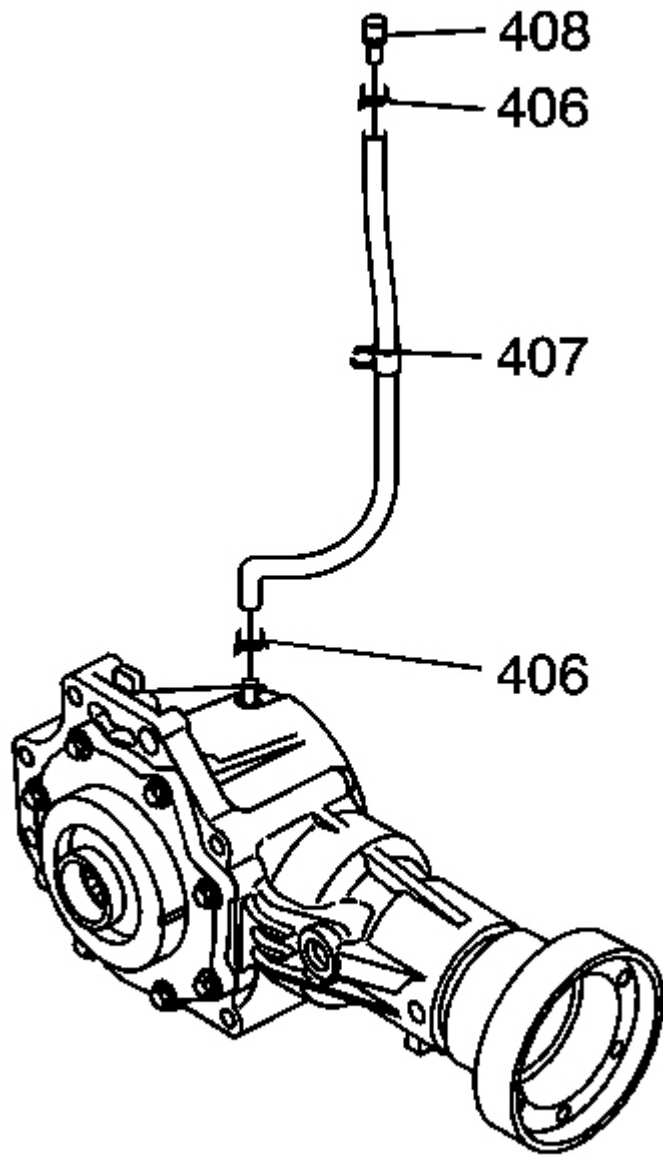


Fig. 14: View Of Transfer Case
Courtesy of GENERAL MOTORS CORP.

1. Remove the ventilation valve (408), hose (407) and clamps (406).

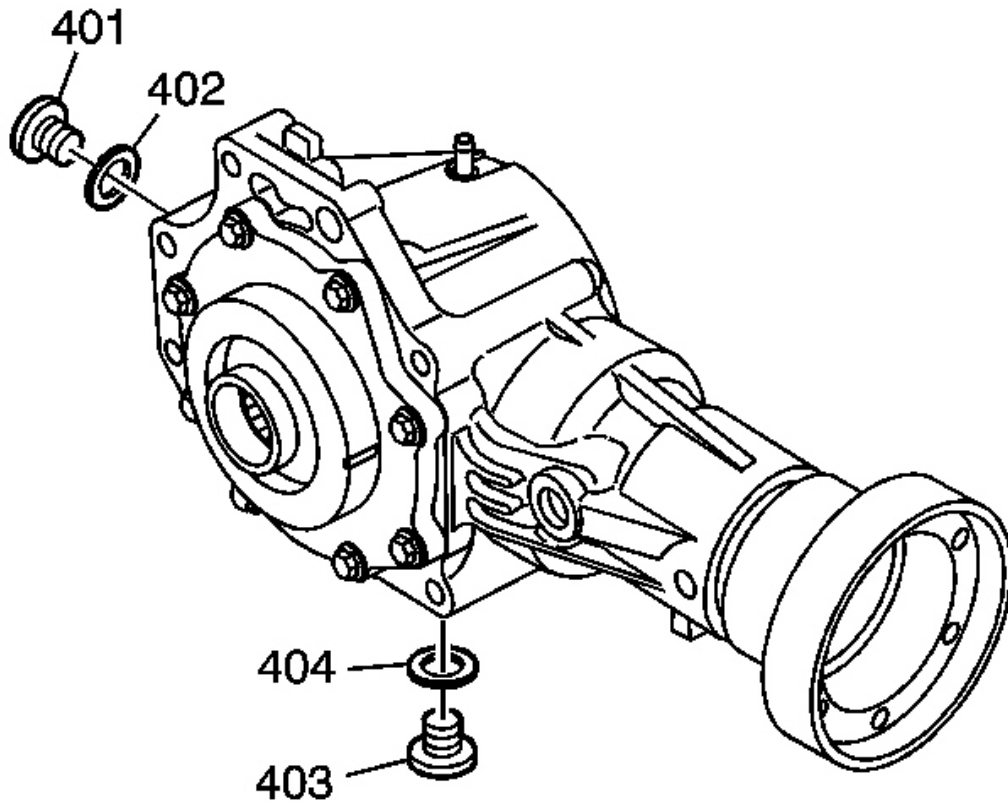


Fig. 15: Removing/Installing Fill Plug, Washer, Drain Plug & Washer
Courtesy of GENERAL MOTORS CORP.

2. Remove the drain plug (403) and washer (404).
3. Remove the fill plug (401) and washer (402).

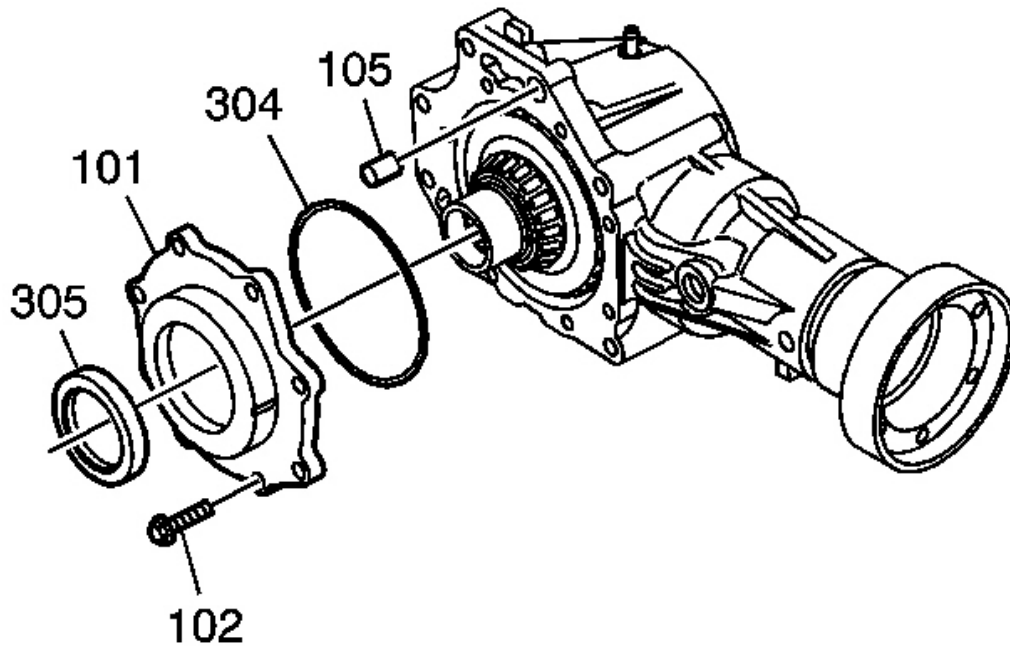


Fig. 16: Removing Bolts, Cover, Seal, O-Ring & Locating Pin
Courtesy of GENERAL MOTORS CORP.

4. Remove the bolts (102) and cover (101).
5. Remove the seal (305) and O-ring (304).
6. Remove the locating pin (105).

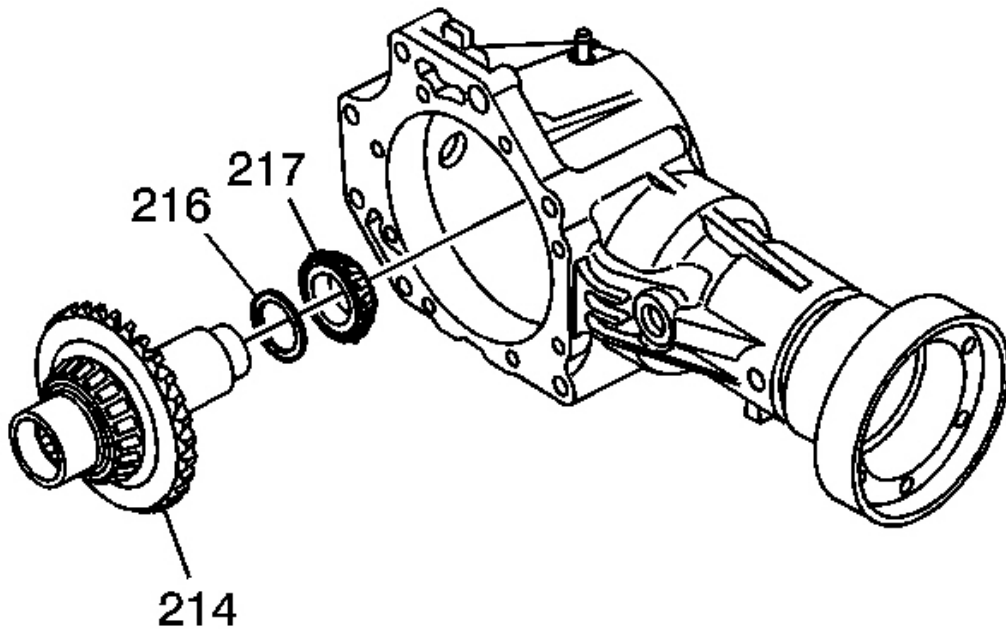


Fig. 17: Removing/Installing Input Gear, Bearing & 25 mm Shim
Courtesy of GENERAL MOTORS CORP.

7. Remove the input gear (214).
8. Remove the bearing (217) and 25 mm shim (216).
9. Mark or tag the shim (216) for assembly.

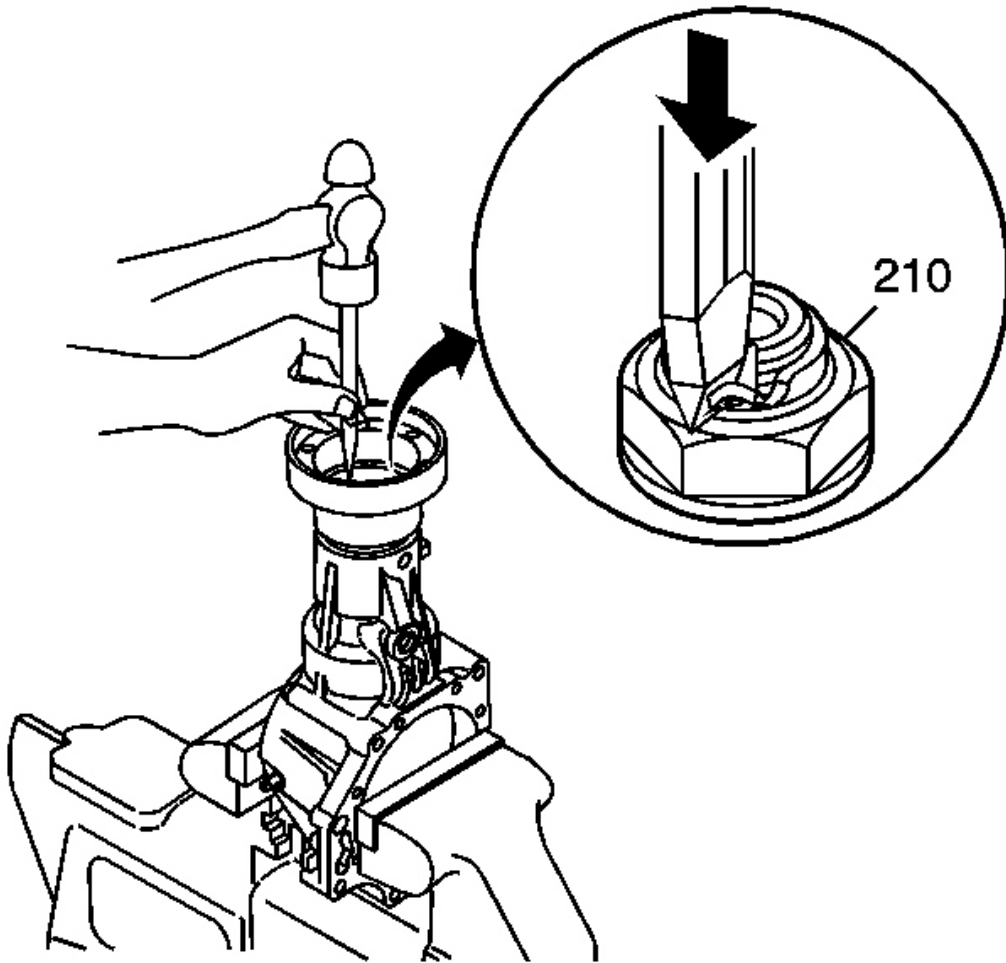


Fig. 18: Cutting Lock Tab Using A Chisel
Courtesy of GENERAL MOTORS CORP.

10. Secure the case in a vise with soft jaws.
11. Using a chisel, cut the locking tab on the locknut (210).

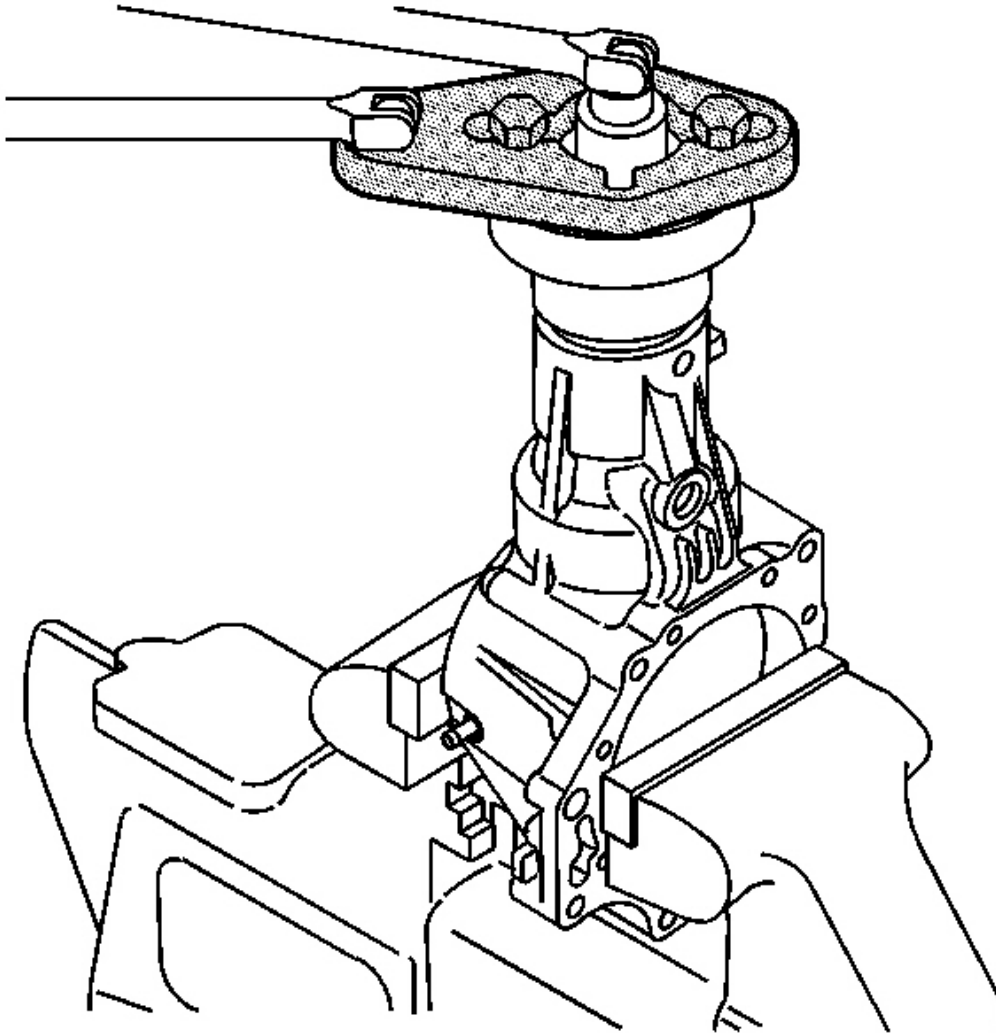


Fig. 19: Installing J44873 & Bolts On The Output Yoke
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

12. Install the **J 44873** and bolts to the output yoke.

Tighten: Tighten the bolts to 48 N.m (35 lb ft).

13. Loosen the locknut.

14. Remove the **J 44873** and bolts.

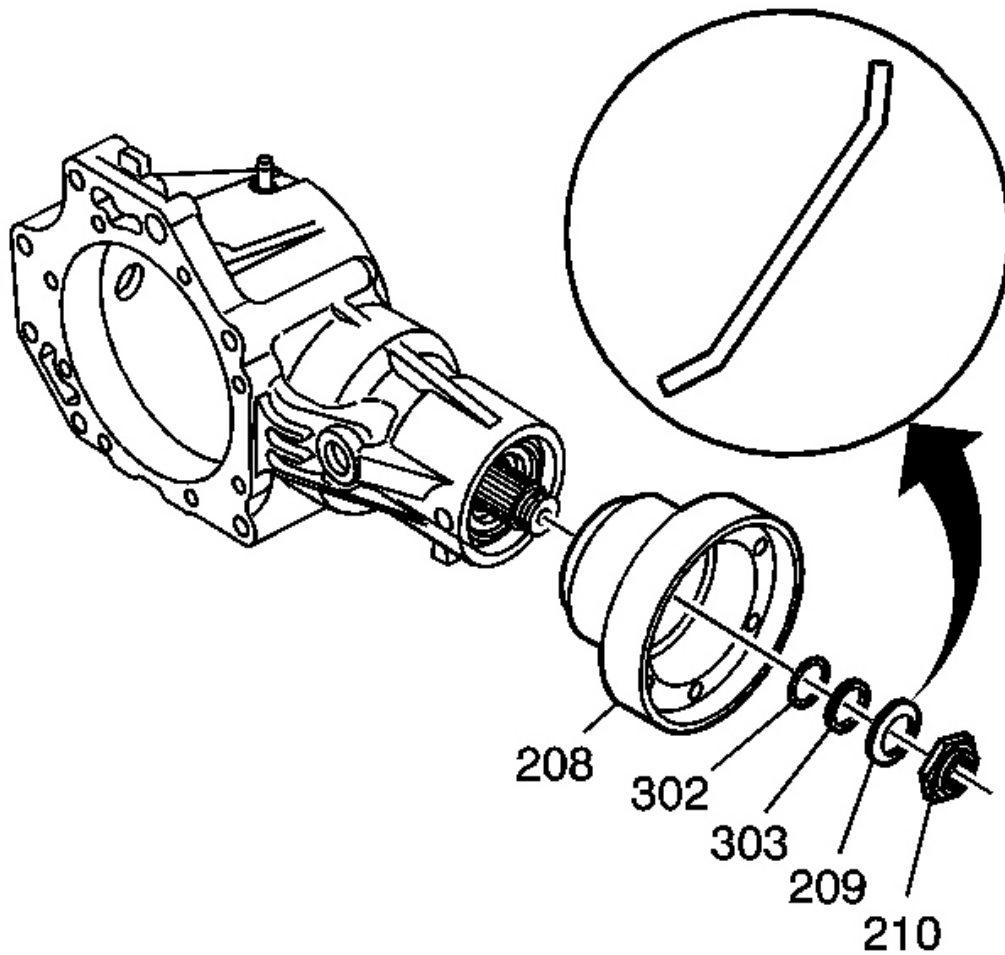


Fig. 20: Removing/Installing Locknut, Washer, Sealing Washer, O-Ring & Output Yoke
Courtesy of GENERAL MOTORS CORP.

15. Remove the nut (210), washer (209), sealing washer (303), O-ring (302), and output yoke (208). Note the washer (209) installed position.

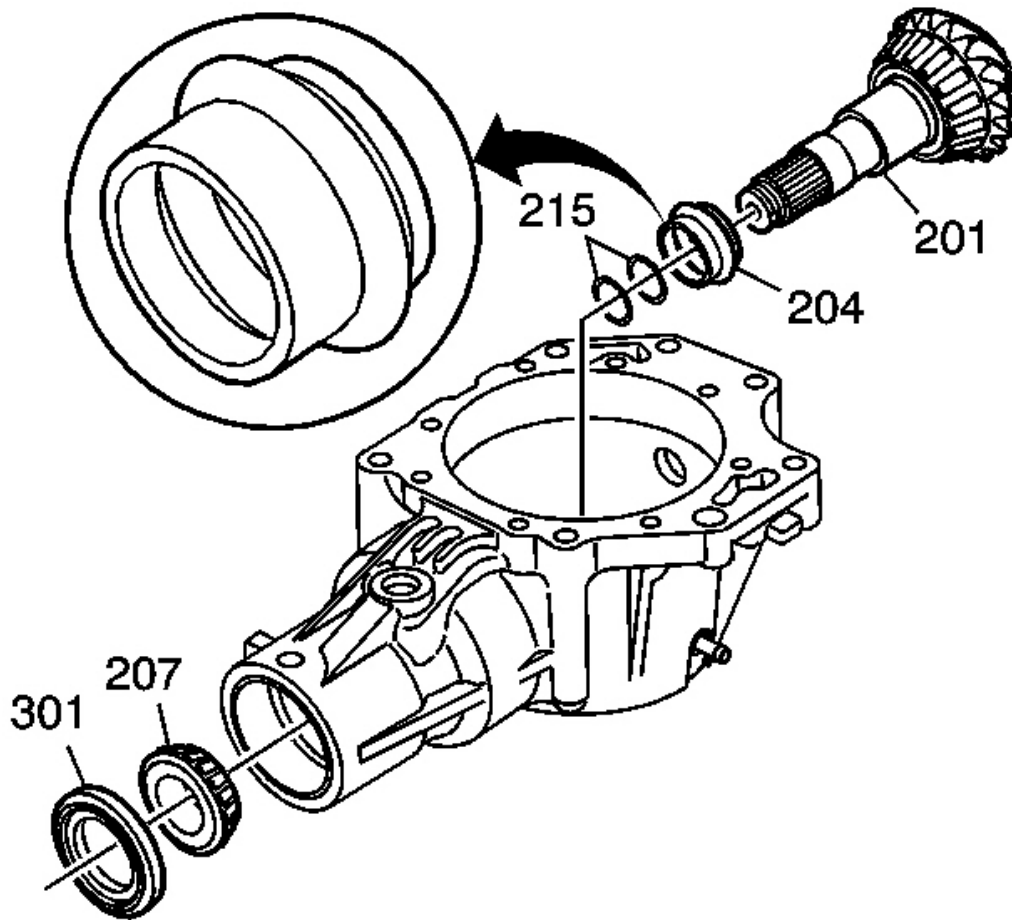


Fig. 21: Removing/Installing Output Shaft, Collapsible Spacer, Washer, Seal, & Bearing
Courtesy of GENERAL MOTORS CORP.

16. Remove the output shaft (201) with bearing, collapsible spacer (204) and washers (215).
17. Remove the seal (301) and bearing (207).

TRANSFER CASE ASSEMBLY INSPECTION

Tools Required

SA9179NE Dial Indicator. See **Special Tools and Equipment** .

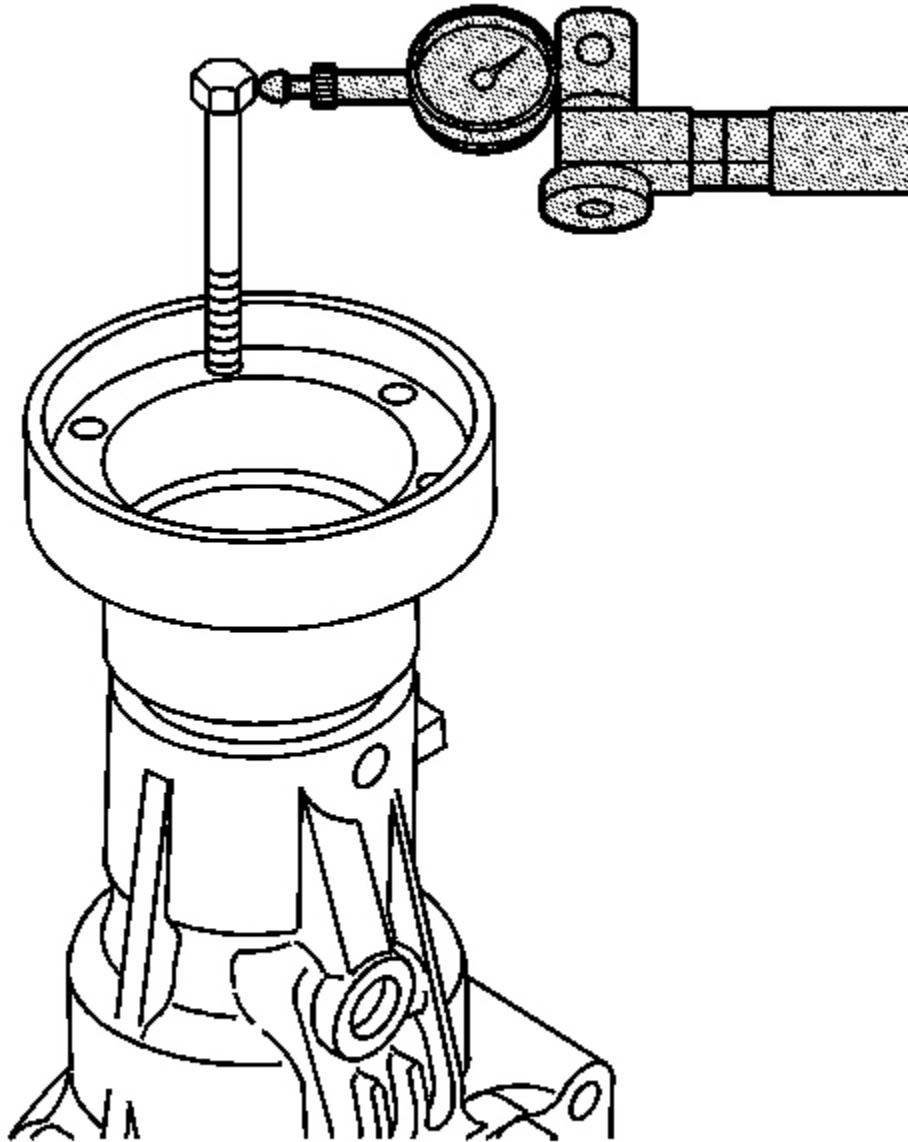


Fig. 22: View Of Transfer Case Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The inspections below are to be used as a basic functional test of the transfer case assembly. Complete disassembly and inspection of the internal components may be required to identify worn bearings, a worn gear set or other internal damage.

1. Use the **SA9179NE** in order to measure the output shaft/input gear backlash. See **Special Tools and Equipment** .

Specification: 0.06-0.16 mm (0.0024-0.0063 in)

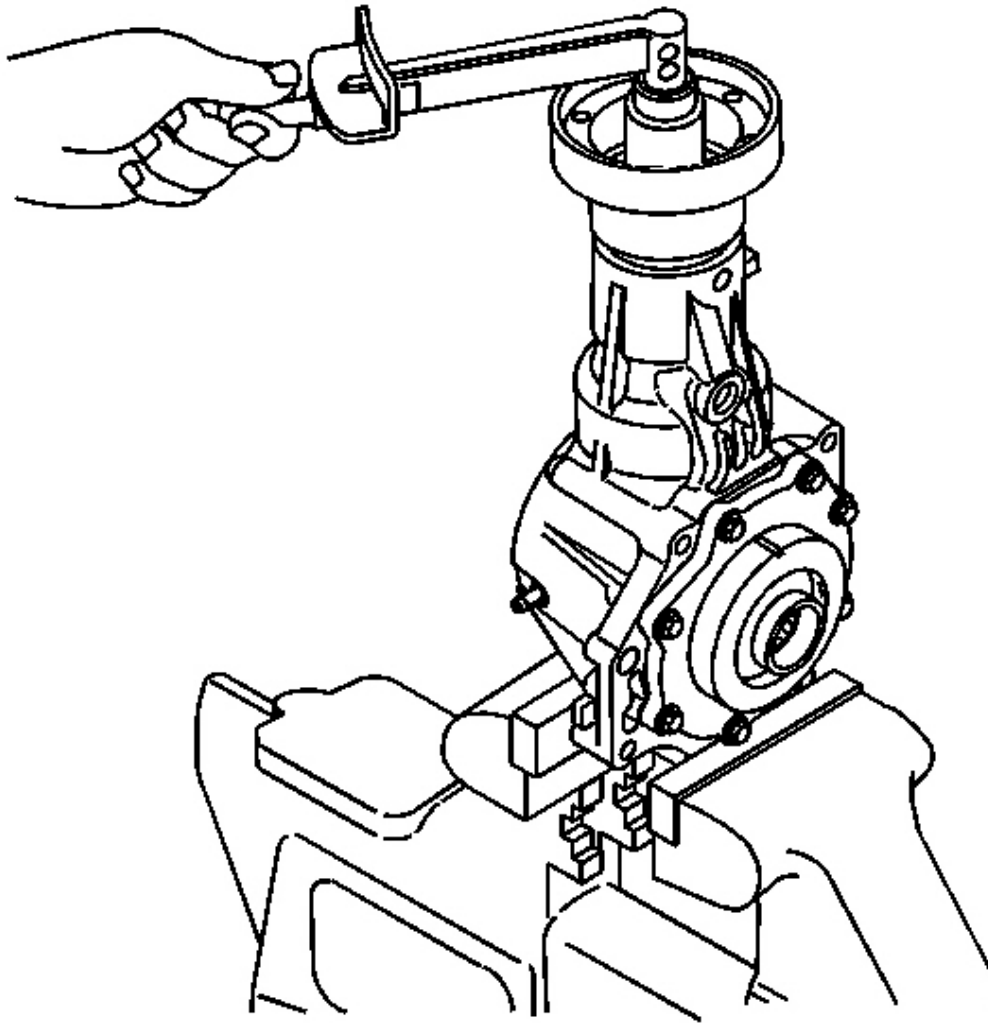


Fig. 23: Securing Case With A Soft Jaws
Courtesy of GENERAL MOTORS CORP.

2. Secure the case in a bench vise with soft jaws.
3. Measure the output shaft/input gear rotating torque.

Specification: 3.20-4.16 mm (28.2-34.3 lb in)

4. If the measurements are not within specifications, replace the transfer case as required.

TRANSFER CASE HOUSINGS CLEANING AND INSPECTION

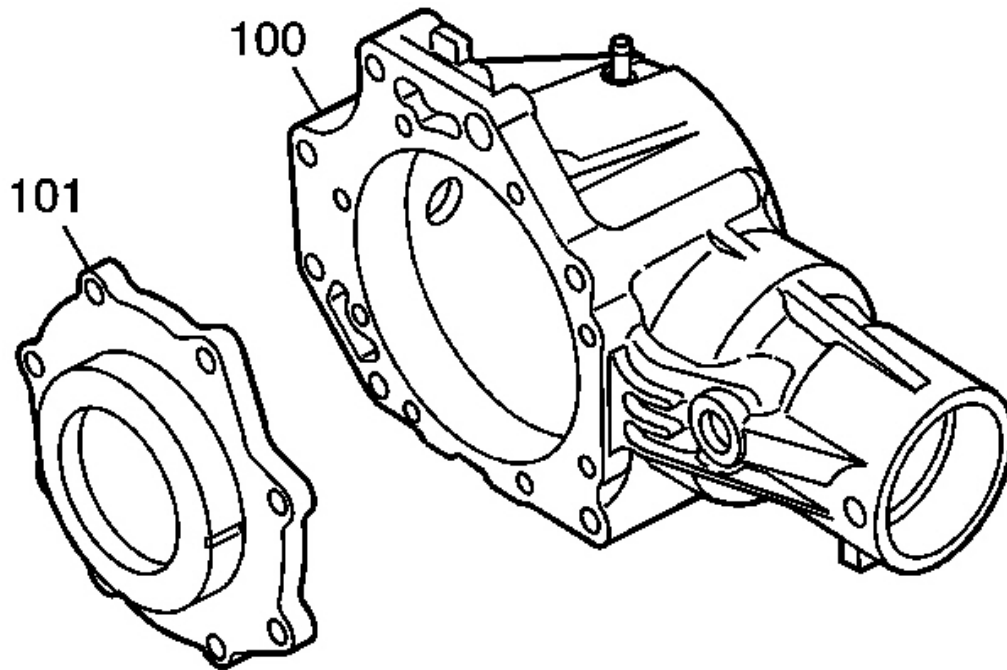


Fig. 24: View Of Transfer Case Housings
Courtesy of GENERAL MOTORS CORP.

1. Inspect the case (100) for the following conditions:
 - Damaged sealing surfaces
 - Damaged bolt hole threads
 - Worn or scored bearing race bores
 - Loose or restricted ventilation tube
 - Porosity
 - Damage to the exterior of the case
2. Inspect the cover (101) for the following conditions:
 - Damaged sealing surfaces
 - Worn or scored bearing race bore

- Porosity
- Damage to the exterior of the cover

INTERNAL COMPONENTS CLEANING AND INSPECTION

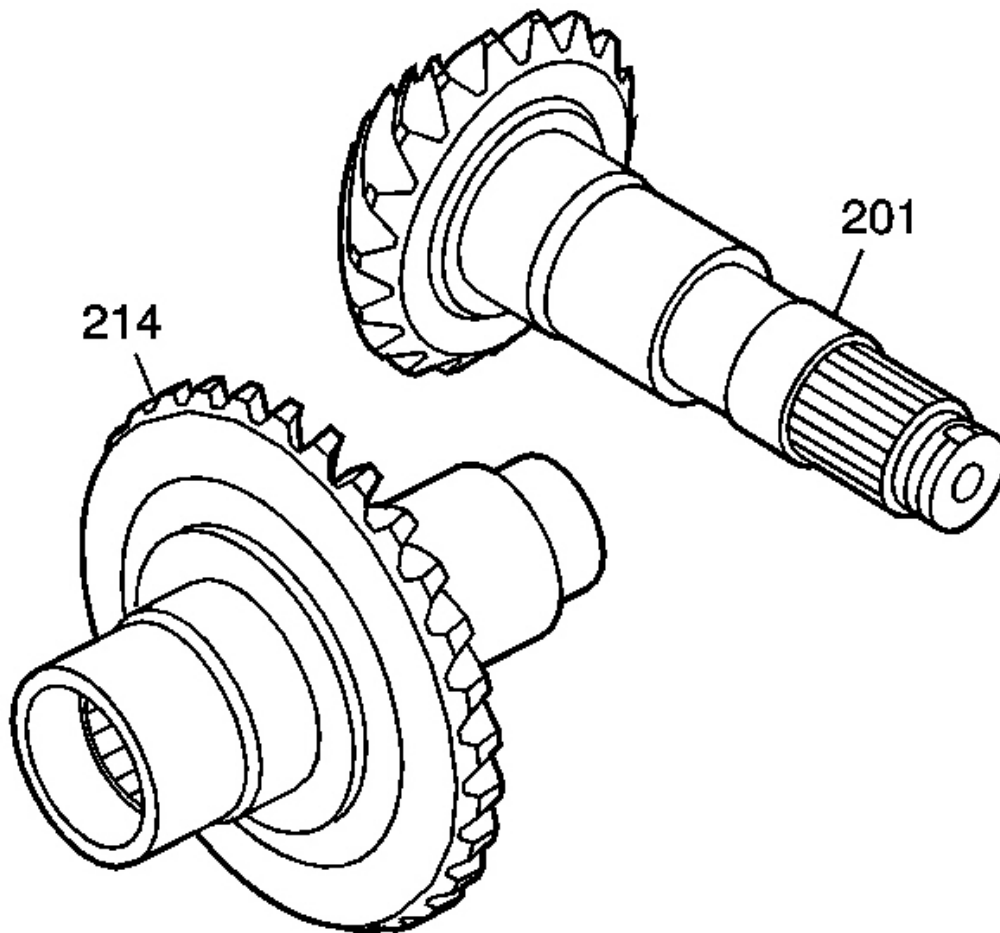


Fig. 25: View Of Internal Components
Courtesy of GENERAL MOTORS CORP.

1. Inspect the output shaft (201) for the following conditions:
 - Worn or damaged splines
 - Damaged threads
 - Excessive wear or scoring on the sealing surface

- Worn gear teeth
2. Inspect the input gear (214) for the following conditions:
- Worn or damaged splines
 - Excessive wear or scoring on the sealing surface
 - Worn gear teeth

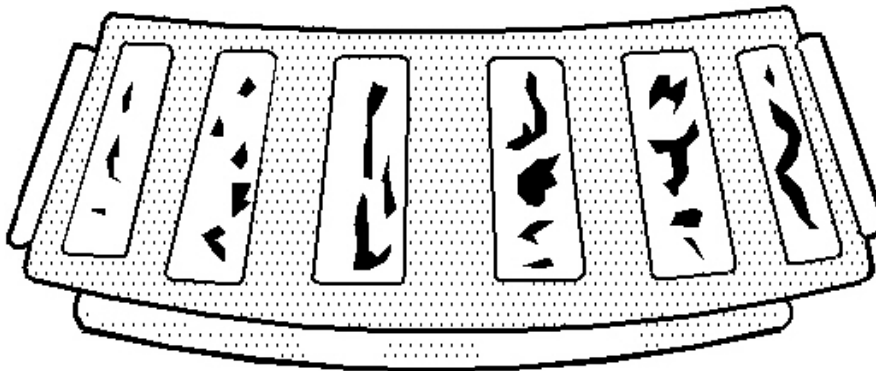


Fig. 26: Inspect Bearing Rollers And Races
Courtesy of GENERAL MOTORS CORP.

3. Inspect the bearing rollers and races for the following conditions:
- Pitting
 - Scoring or grooves
 - Excessive wear or heat discoloration

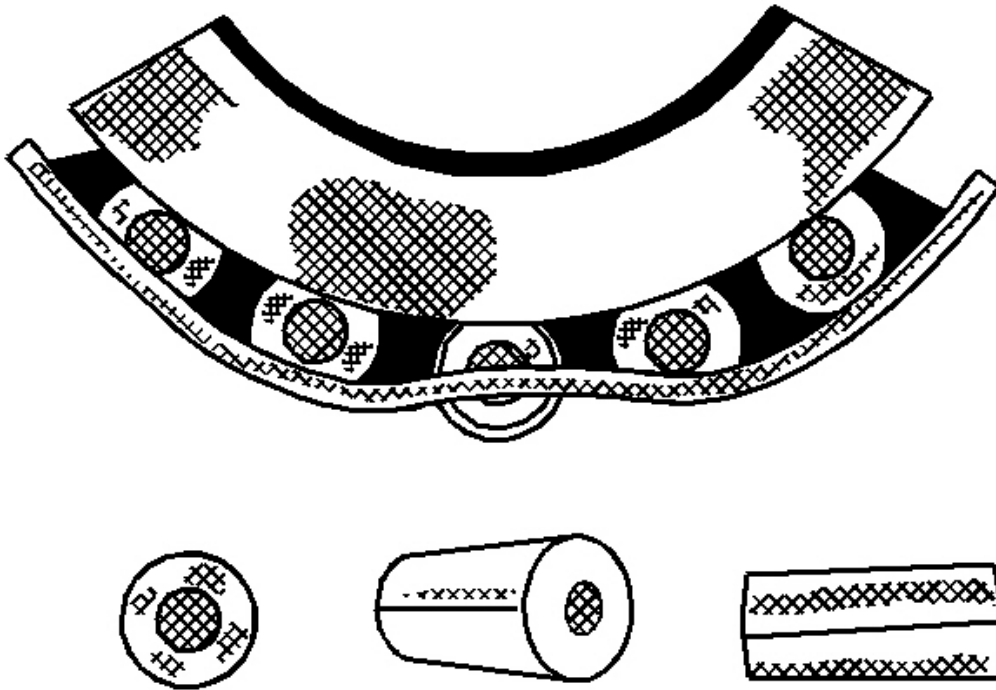


Fig. 27: Bent Roller Cage
Courtesy of GENERAL MOTORS CORP.

4. Inspect the bearings for bent roller cages.

TRANSFER CASE ASSEMBLE

Tools Required

- **DT 46429** Oil Seal Driver. See **Special Tools and Equipment** .
- **DT 46512** Seal Installer. See **Special Tools and Equipment** .
- **EN 46342** Driver Handle. See **Special Tools and Equipment** .
- **J 44873** Pinion Flange Holder and Remover

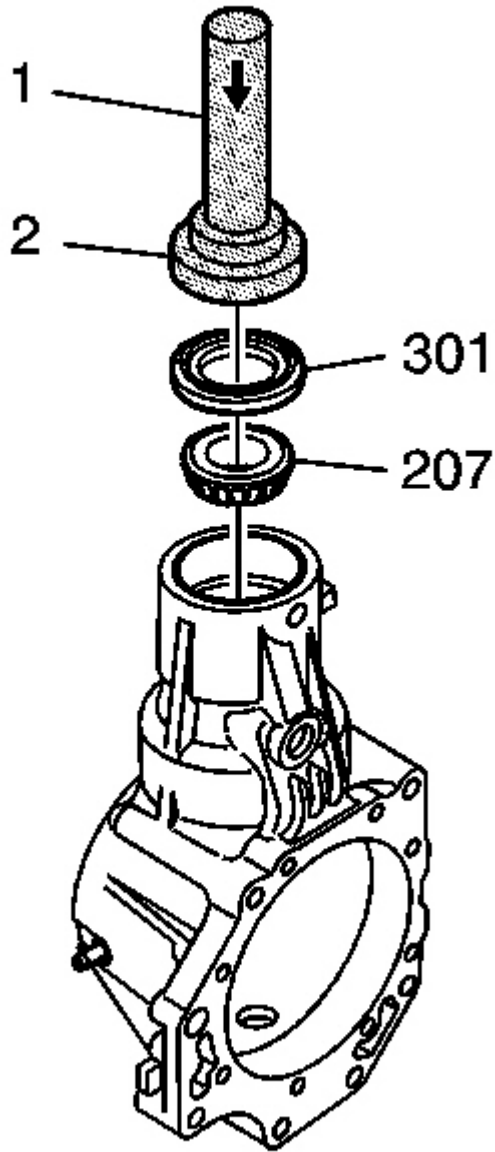


Fig. 28: View Of Transfer Case
Courtesy of GENERAL MOTORS CORP.

1. Lubricate all internal components with GM P/N 12578261 (Canadian P/N 10953455) prior to assembly.
2. Use the EN 46342 (1) DT 46429 (2) in order to install the bearing (207) and seal (301). See **Special Tools and Equipment**

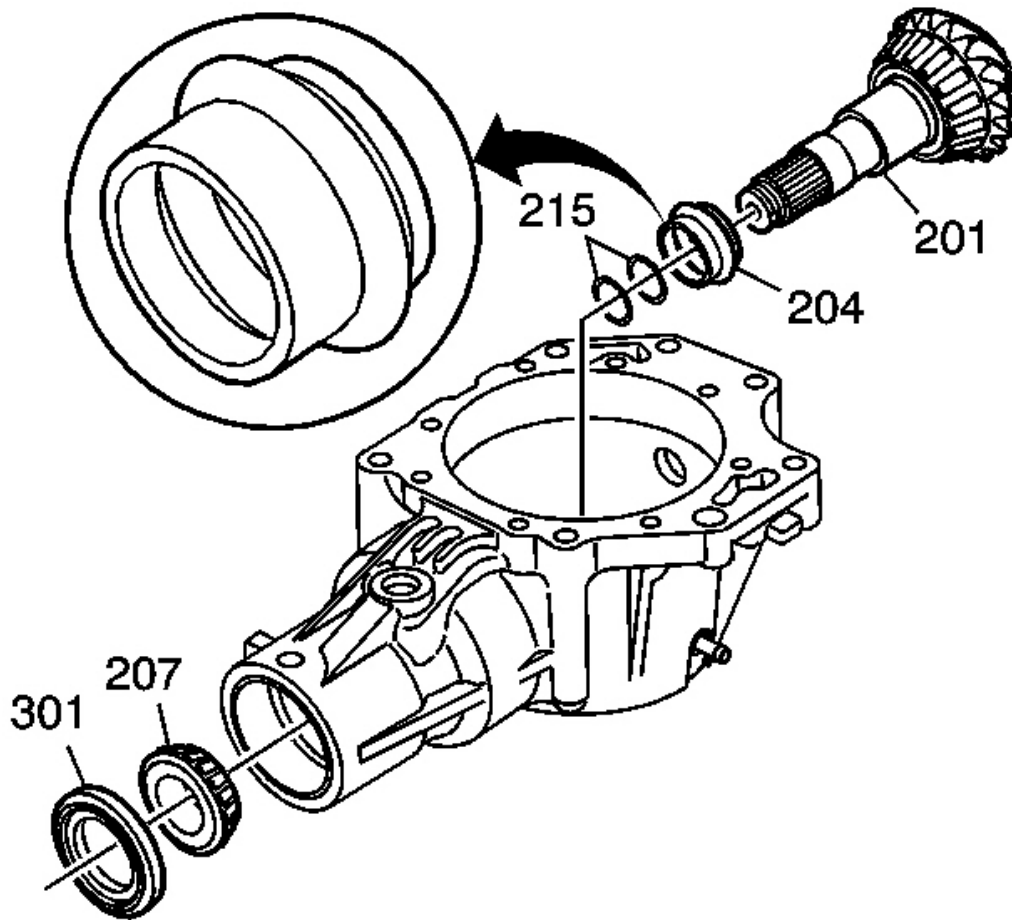


Fig. 29: Removing/Installing Output Shaft, Collapsible Spacer, Washer, Seal, & Bearing
Courtesy of GENERAL MOTORS CORP.

3. Install the output shaft (201) with bearing, NEW collapsible spacer (204) and washers (215). Note the proper installation direction of the spacer (204).

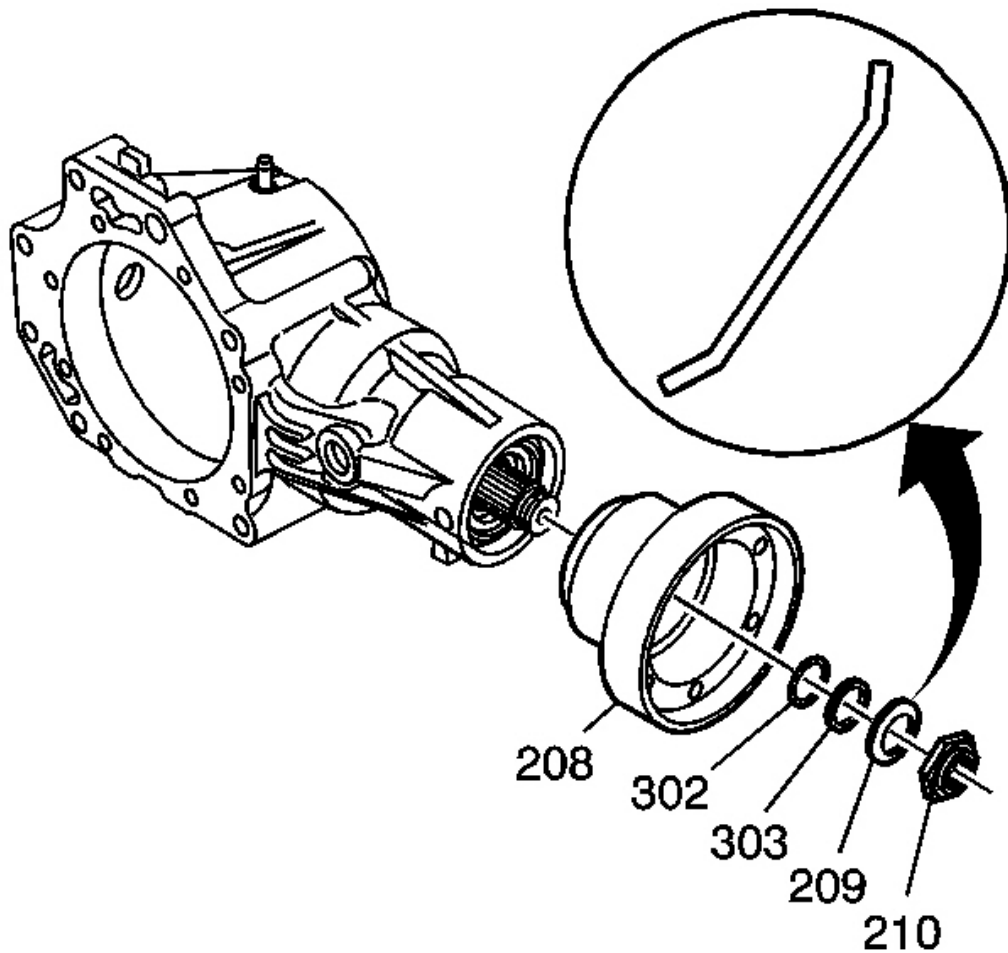


Fig. 30: Removing/Installing Locknut, Washer, Sealing Washer, O-Ring & Output Yoke
Courtesy of GENERAL MOTORS CORP.

4. Lubricate the threads of the output shaft with GM P/N 12378261 (Canadian P/N 10953455).
5. Install the output yoke (208), NEW O-ring (302), NEW sealing washer (303), NEW washer (209) and NEW locknut (210).

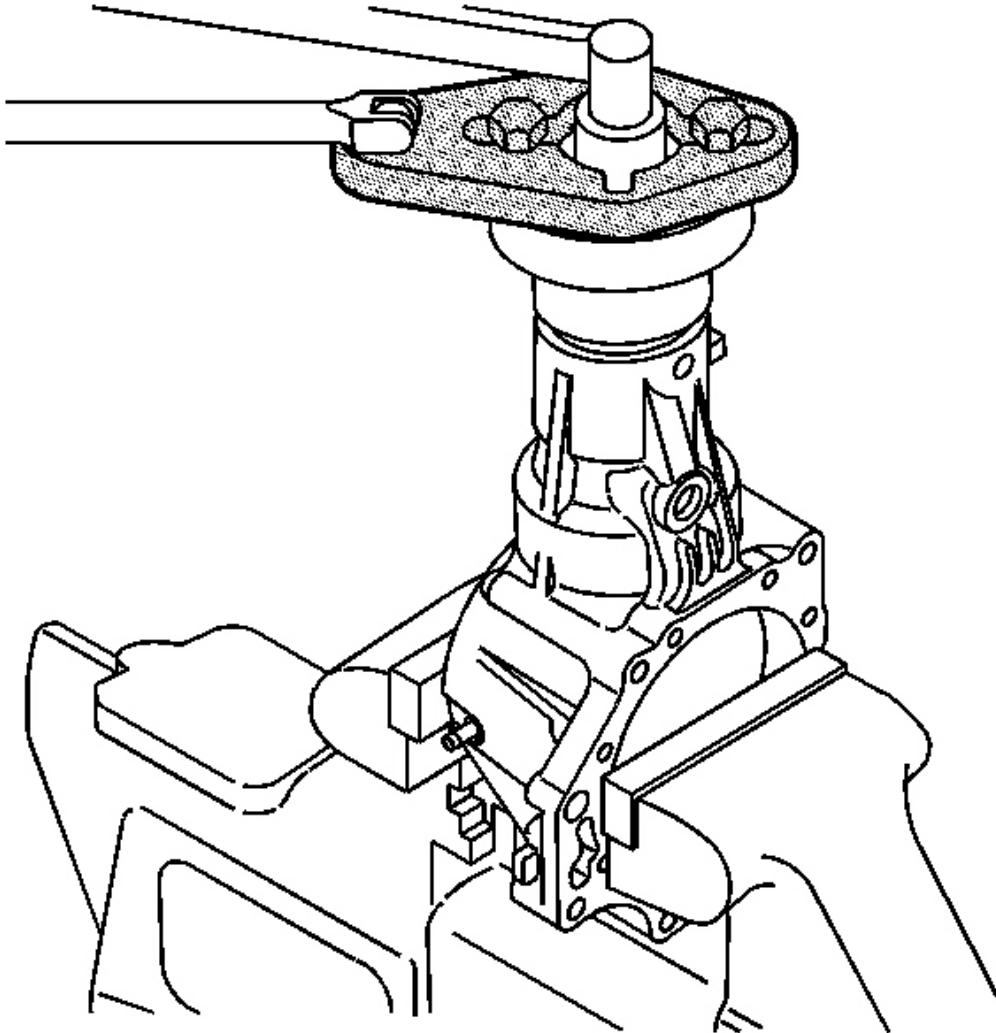


Fig. 31: Removing/Installing J44873 & Bolts
Courtesy of GENERAL MOTORS CORP.

6. Secure the case in a vise with soft jaws.

NOTE: Refer to Fastener Notice in Cautions and Notices.

7. Install the **J 44873** and bolts.

Tighten: Tighten the bolts to 48 N.m (35 lb ft).

IMPORTANT: Rotate the output yoke several times in both directions to seat the tapered roller bearings prior to measuring the rotating torque.

8. Tighten the locknut to 108-294 N.m (75.6-217 lb ft) while measuring the rotating torque. Tighten the nut to achieve a rotating torque of 1.15-1.71 N.m (10.2-15.1 lb in).
 - If the rotating torque exceeds 1.71 N.m (15.1 lb in), replace the collapsible spacer and reassemble.
 - If the locknut tightening torque exceeds 294 N.m (217 lb ft), replace the collapsible spacer and reassemble.
9. Remove the **J 44873** and bolts.

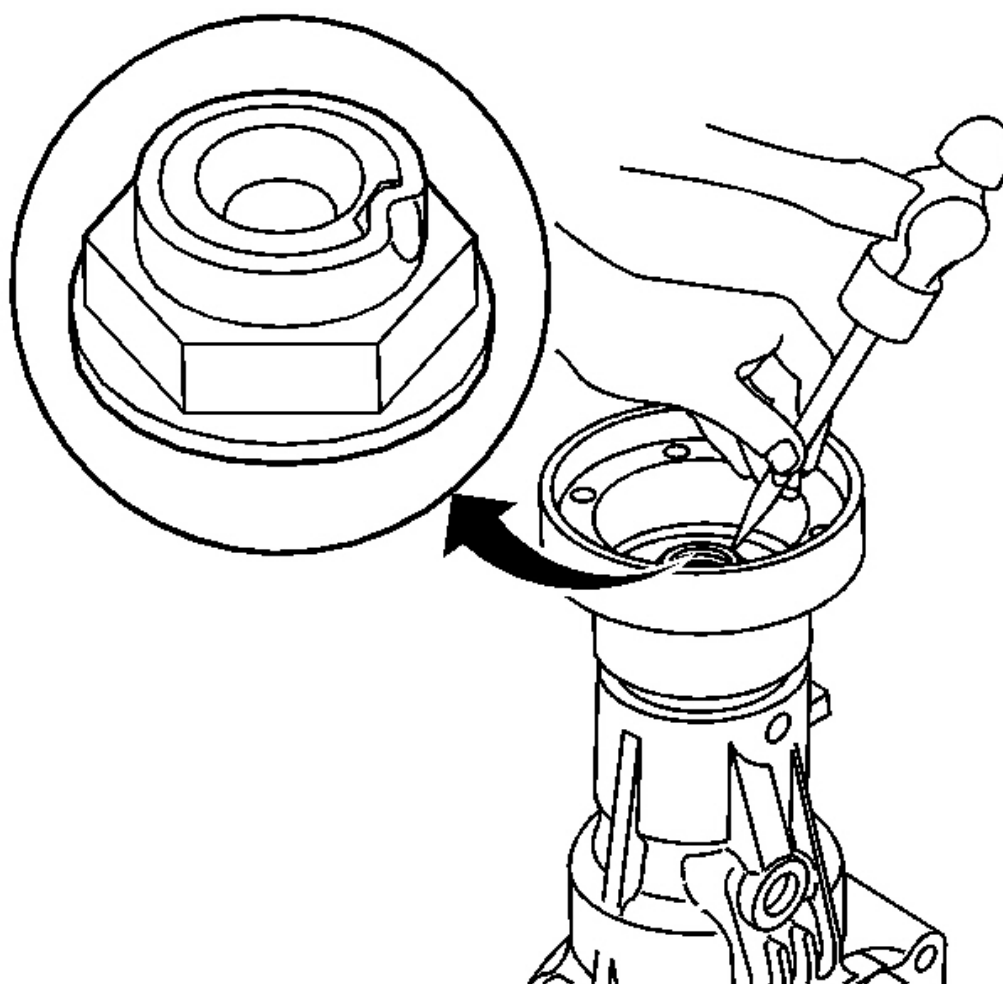


Fig. 32: Staking Locknut Using 3.5 mm Punch
Courtesy of GENERAL MOTORS CORP.

10. Stake the locknut using a 3.5 mm (0.138 in) punch.

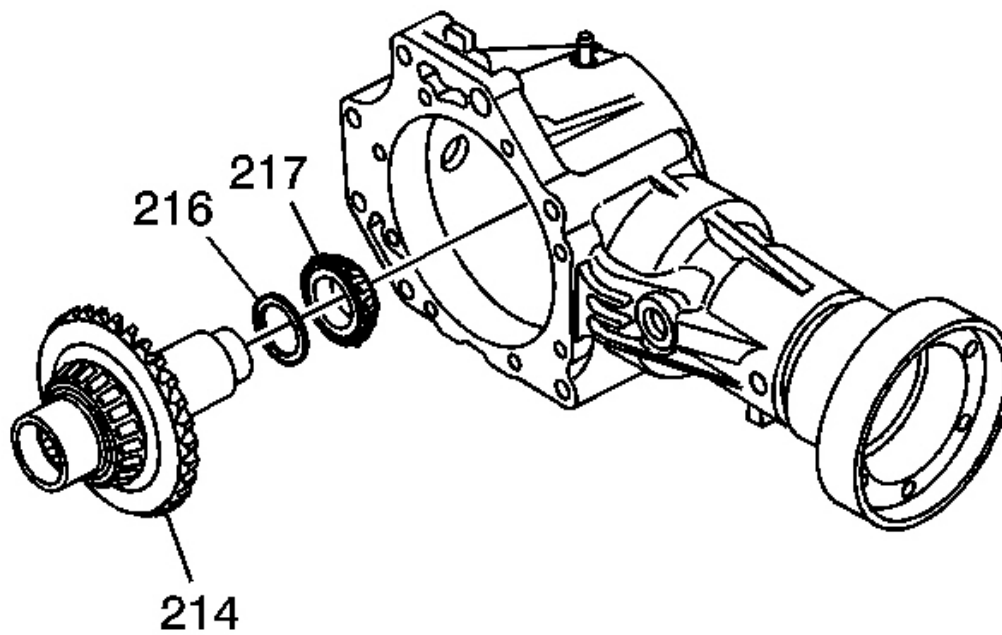


Fig. 33: Removing/Installing Input Gear, Bearing & 25 mm Shim
Courtesy of GENERAL MOTORS CORP.

11. Install the input gear (214) with shim (216) and bearing (217) into the case.

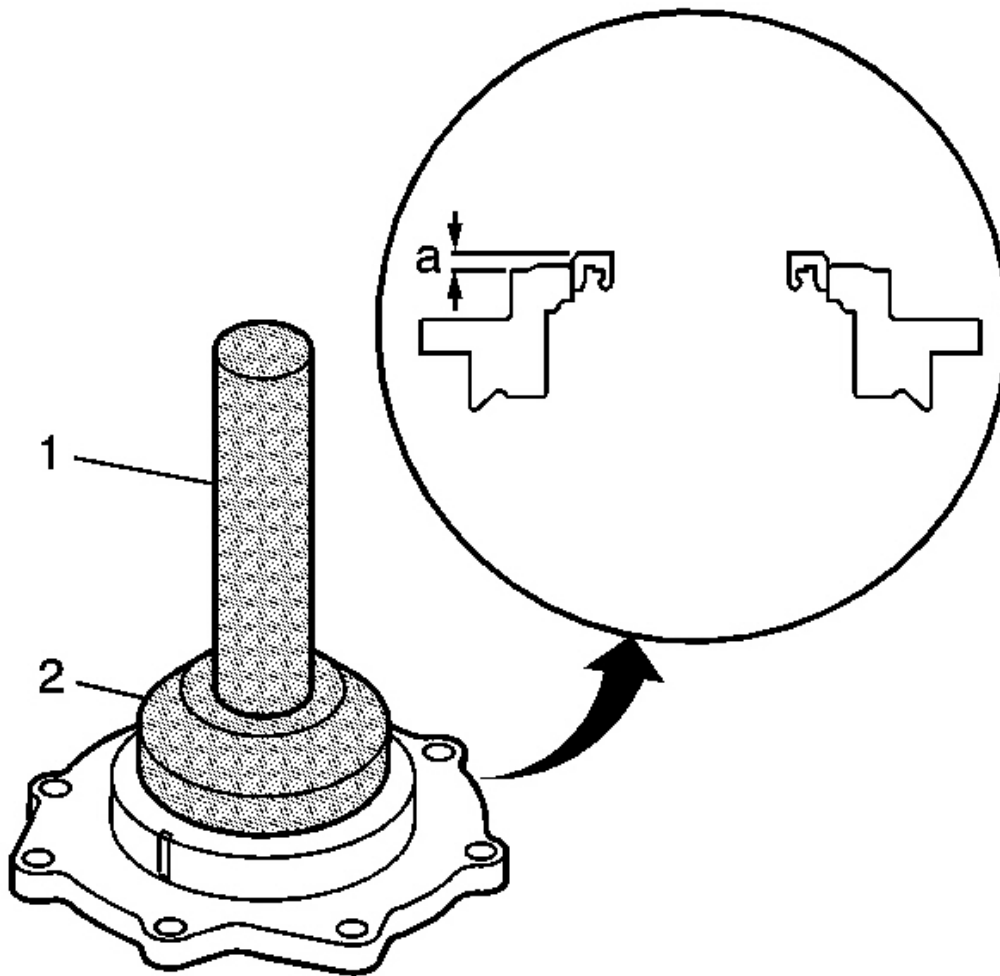


Fig. 34: Using EN 46342
Courtesy of GENERAL MOTORS CORP.

12. Use the **EN 46342** (1) and the **DT 46512** (2) in order to install the oil seal into the cover. See **Special Tools and Equipment** . Install the seal until the flat surface of the seal measures 0.00-1.0 mm (0.00-0.04 in) flush with or slightly above the surface of the cover (a).

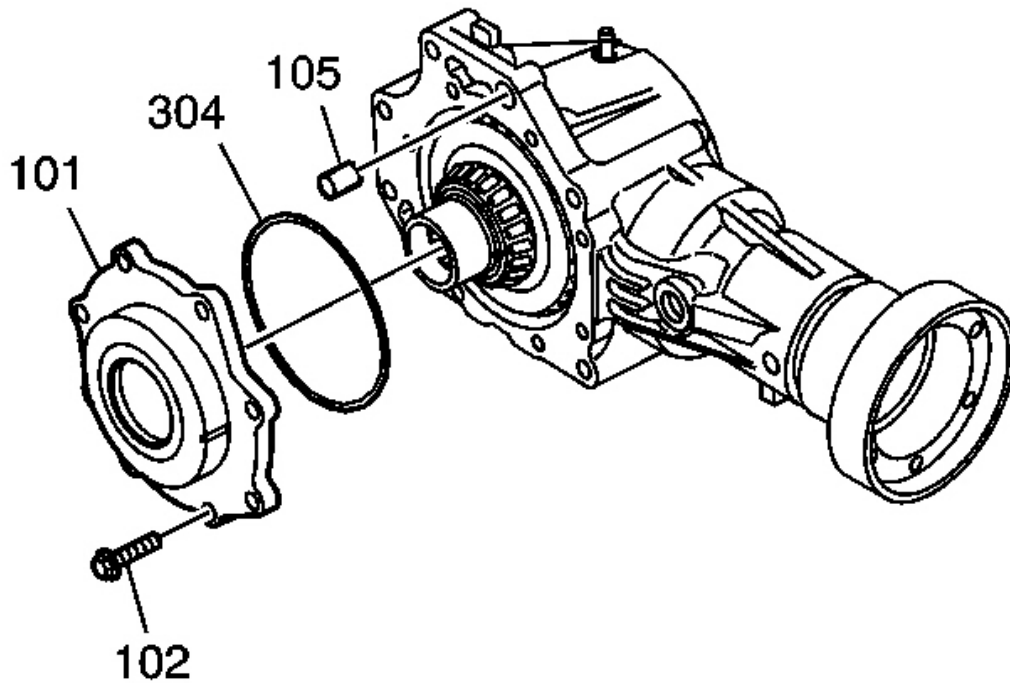


Fig. 35: Installing O-Ring, Cover, Bolts & Locating Pin
Courtesy of GENERAL MOTORS CORP.

13. Install a NEW O-ring (304) to the cover.
14. Install the cover (101) and bolts (102).

Tighten: Tighten the bolts to 26 N.m (20 lb ft).

15. Install the locating pin (105).

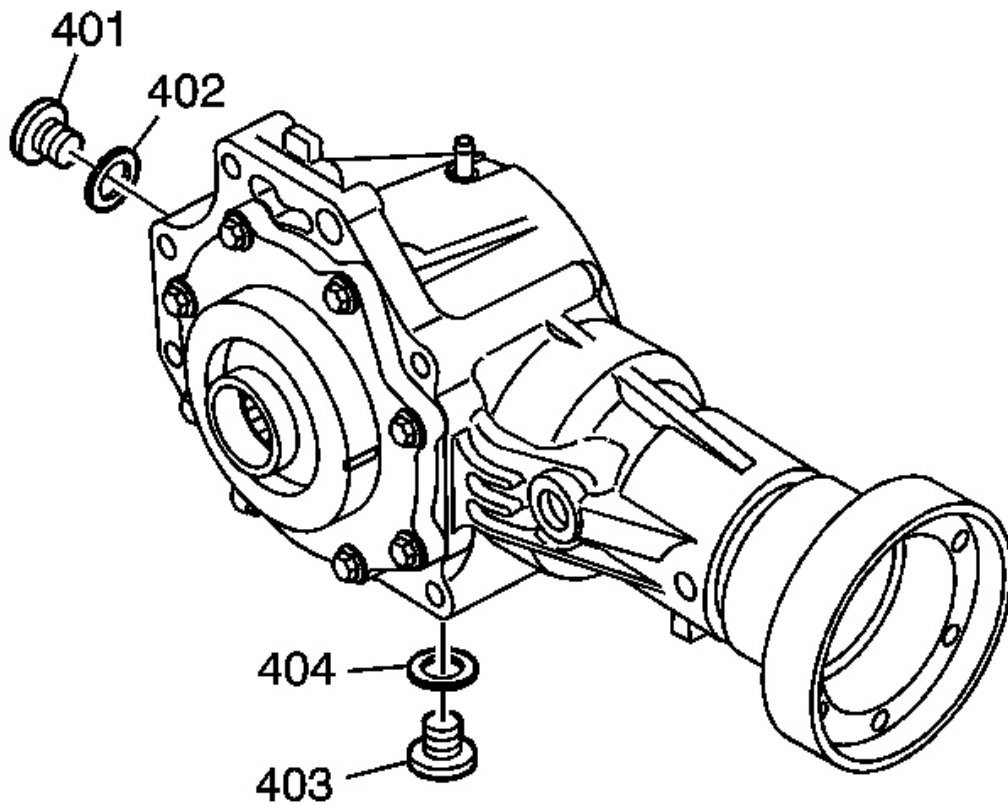


Fig. 36: Removing/Installing Fill Plug, Washer, Drain Plug & Washer
Courtesy of GENERAL MOTORS CORP.

16. Install the fill plug (401) and NEW washer (402).
17. Install the drain plug (403) and NEW washer (404).

Tighten: Tighten the drain plug to 44 N.m (33 lb ft).

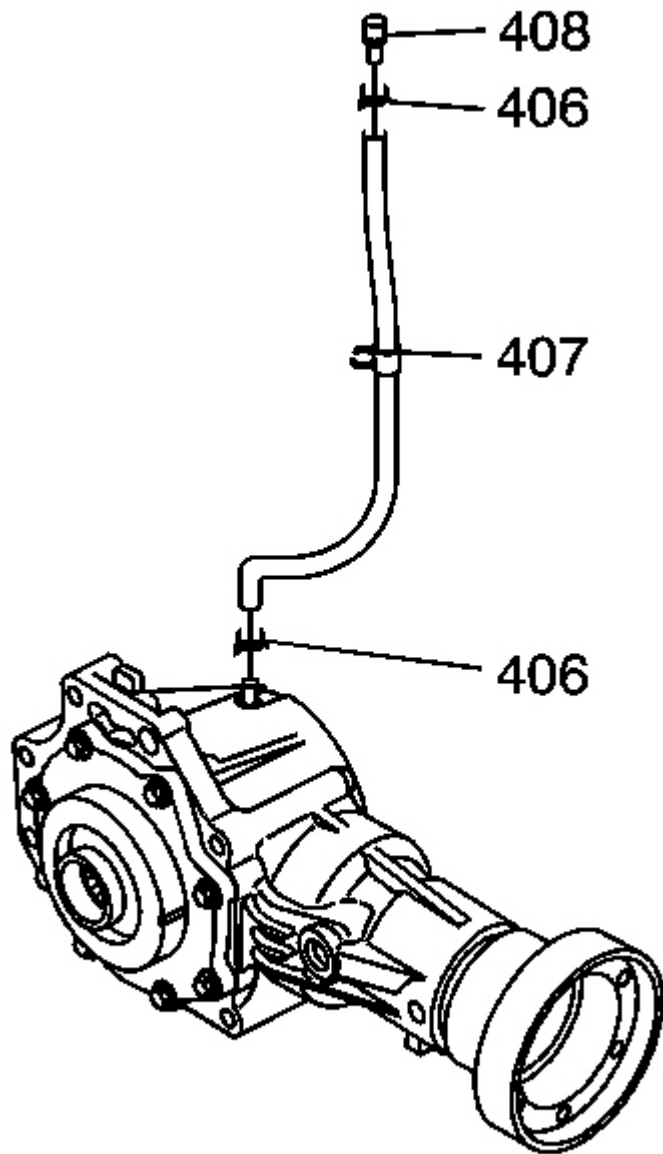


Fig. 37: View Of Transfer Case
Courtesy of GENERAL MOTORS CORP.

18. Install the ventilation valve (408), hose (407) and clamps (406).
19. Recheck the unit for proper assembly. Refer to **Transfer Case Assembly Inspection** .

DESCRIPTION AND OPERATION

TRANSFER CASE DESCRIPTION AND OPERATION

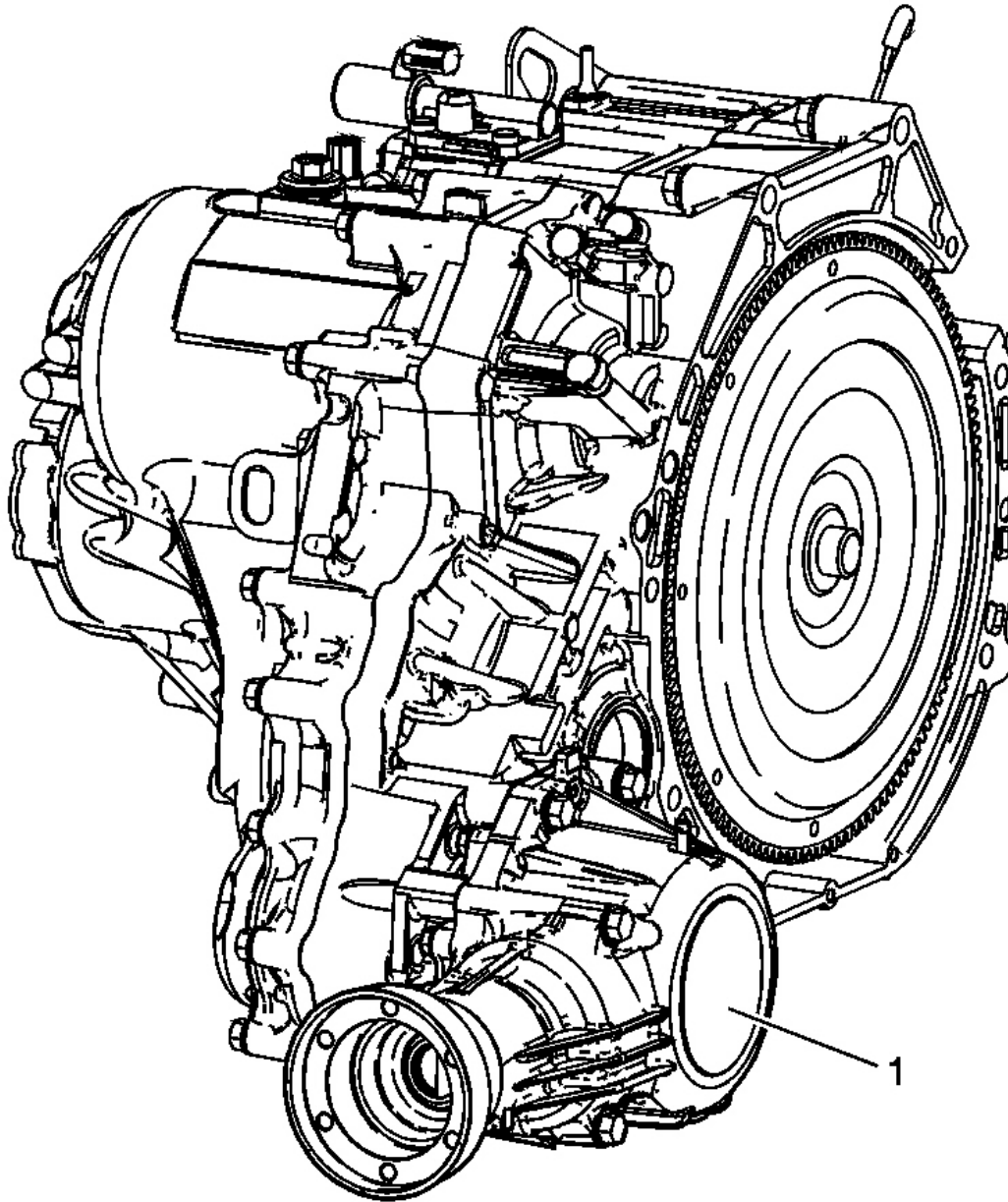


Fig. 38: View Of Transfer Case Assembly
Courtesy of GENERAL MOTORS CORP.

The Honda AWD transfer case (1) is mated to the rear side of the 5-speed automatic transmission assembly beside the differential. The transfer case assembly consists of an aluminum case and side cover and drive and driven gears. The gear set is a hypoid design. Both the drive and driven gear shafts are supported by tapered roller bearings. Pinion depth, gears backlash, and bearing preloads are adjusted during production using 25, 40, and 80 mm shims of various thickness. The internal components of the transfer case are lubricated by hypoid gear oil.

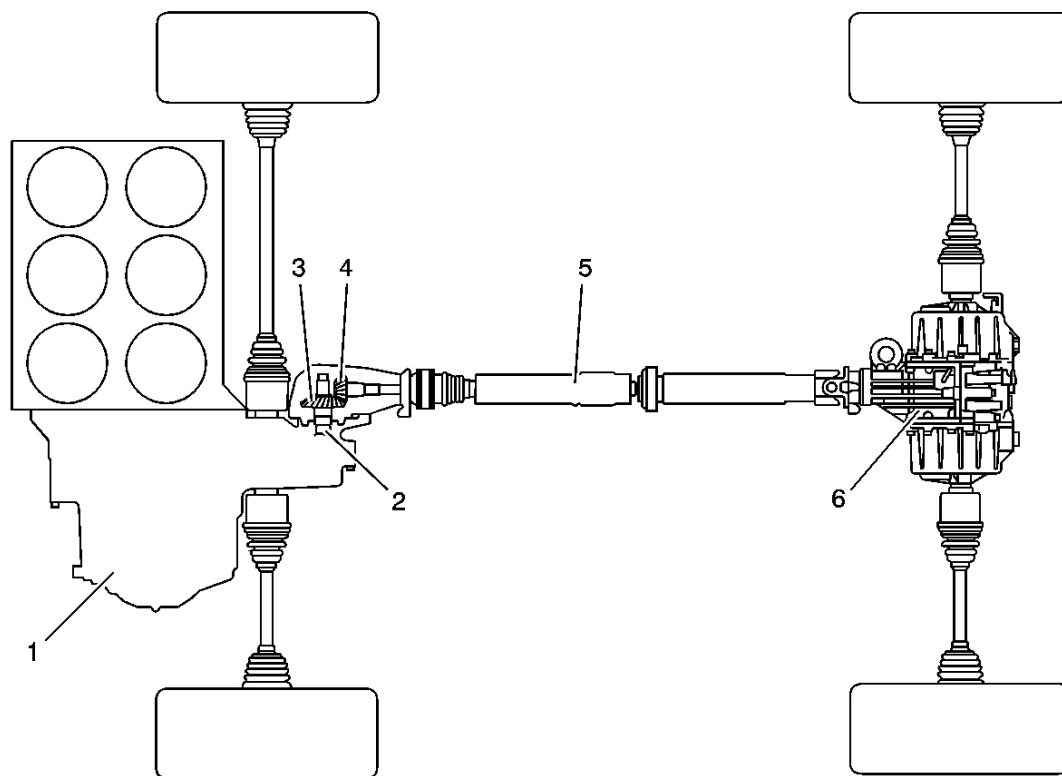


Fig. 39: View Of Transfer Case Output Shaft
 Courtesy of GENERAL MOTORS CORP.

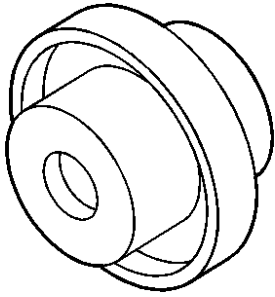
The transmission (1) differential drive gear rotates the transfer output sub-shaft (2). The transfer output sub-shaft is splined to and drives the transfer case input gear (3). The transfer case output shaft (4) transfers power through the output flange to the Variable Torque Management rear differential (6) via a 2-piece propeller shaft assembly (5).

SPECIAL TOOLS AND EQUIPMENT

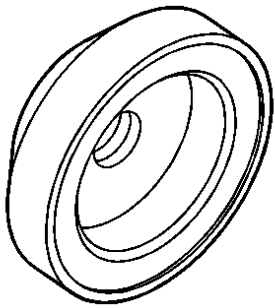
SPECIAL TOOLS

Special Tools

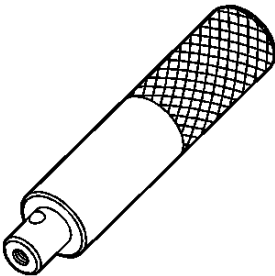
Illustration	Tool Number/Description



DT 46429
Oil Seal Driver

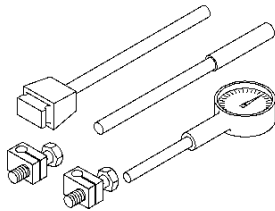
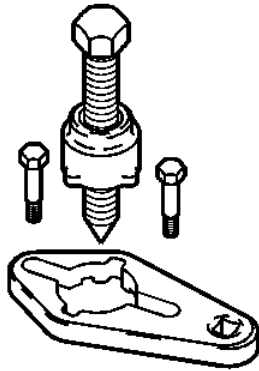


DT 46512
Seal Installer



EN 46342
Driver Handle

J 44873
Pinion Flange Holder and Remover



SA9179NE
Dial Indicator

2004 DRIVELINE/AXLE

Transfer Case - NVG 900 - Vue

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Drain Plug	24 N.m	18 lb ft
Fill Plug	15 N.m	11 lb ft
Mounting Bracket Bolts	61 N.m	45 lb ft
Side Cover Bolts	37 N.m	27 lb ft

TRANSFER CASE SPECIFICATIONS

General Specifications

Application	Specification	
	Metric	English
Pinion Shaft Rotating Torque	0.9-1.6 N.m	8-14 lb in
Pinion to Ring Gear Backlash	0.127-0.178 mm	0.005-0.007 in
System Rolling Torque With Seals	3.2-4.5 N.m	28-40 lb in
System Rolling Torque Without Seals	2.8-3.9 N.m	25-35 lb in
Transfer Case Fill Quantity	500 ml or to the bottom of the fill hole	17 oz or to the bottom of the fill hole

SEALERS, ADHESIVES, AND LUBRICANTS

Sealers, Adhesives, and Lubricants

Application	Type of Material	Saturn Part Number
		United States
Drain Plug Threads	Sealant	21485278
Fill Plug Threads	Sealant	21005994
Gear Lubricant GM Versatrak	Synthetic Gear Oil	12378514
Side Cover-to-Housing	Sealant	1052943
Side Cover Bolts	Thread Locker	12345382

COMPONENT LOCATOR

TRANSFER CASE DISASSEMBLED VIEW

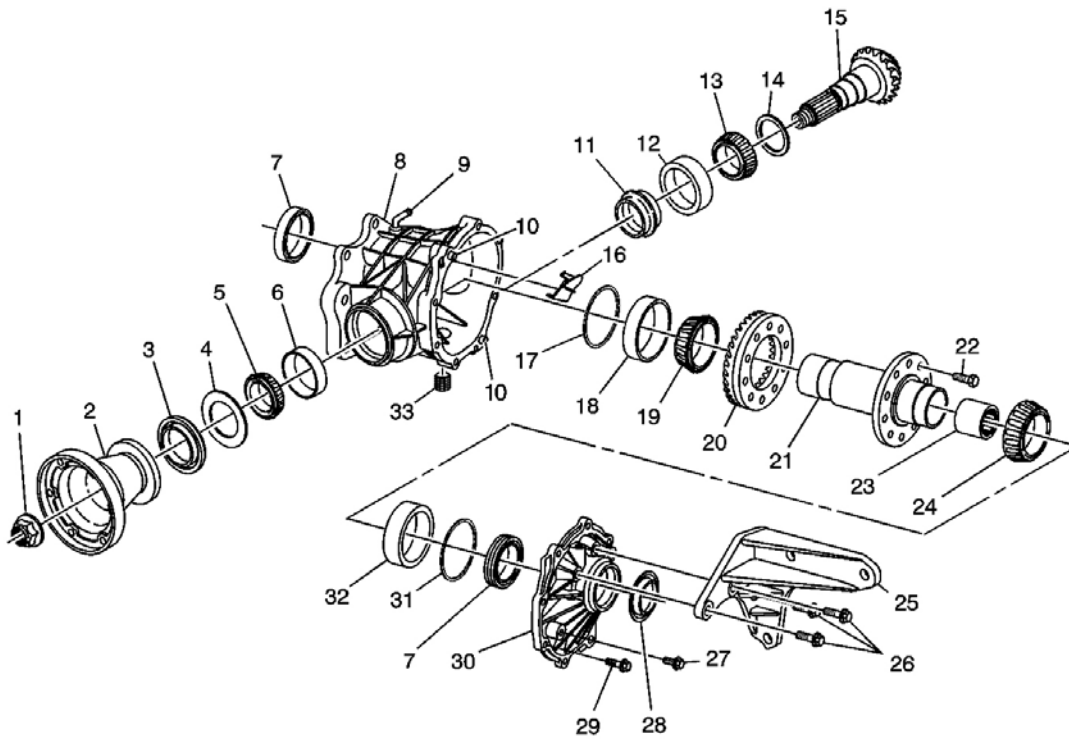


Fig. 1: Transfer Case Disassembled View
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1 Disassembled View

Callout	Component Name
1	Nut
2	Flange
3	Oil Seal
4	Slinger Washer
5	Bearing
6	Bearing Cup
7	Axle Shaft Oil Seal - Left Side
7	Axle Shaft Oil Seal - Right Side
8	Housing
9	Vent
10	Hollow Dowel
10	Hollow Dowel
11	Collapsible Spacer
12	Bearing Cup
13	Bearing
14	Shim

15	Pinion Shaft
16	Vent Baffle
17	Shim
18	Cup
19	Differential Bearing
20	Ring Gear
21	Differential Case
22	Bolt
23	Inner Bearing
24	Bearing
25	Bracket
26	Bolts
27	Fill Plug
28	Axle Shaft Oil Seal - Right Side
29	Bolt
30	Side Cover
31	Shim
32	Bearing Race
33	Drain Plug

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - TRANSFER CASE

Begin system diagnosis by reviewing the **Transfer Case Disassembled View** or **Transfer Case Description and Operation** and **Rear Drive Axle Description and Operation** in Rear Drive Axle. Reviewing the description and operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the description and operation will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Transfer Case** to identify the correct procedure for diagnosing the system and to locate the procedure.

SYMPTOMS - TRANSFER CASE

Strategy Based Diagnostics

Review the system operations in order to familiarize yourself with the system functions. Refer to **Transfer Case Disassembled View** or **Transfer Case Description and Operation** and **Rear Drive Axle Description and Operation** in Rear Drive Axle. All diagnosis on a vehicle should follow a logical process. Strategy based diagnostics is a uniform approach for repairing all systems. The diagnostic flow may always be used in order to resolve a system problem. The diagnostic flow is the place to start when repairs are necessary. For a detailed explanation, refer to **Strategy Based Diagnosis** in General Information.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the vehicle. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Verify the exact operating conditions under which the concern exists. Note factors such as speed, road conditions, ambient temperature, and other specifics.
- Compare the driving characteristics or sounds, if applicable, to a known good vehicle and make sure you are not trying to correct a normal condition.

Intermittent

Test the vehicle under the same conditions that the customer reported in order to verify the system is operating properly.

Symptom List

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

- **Diagnostic Starting Point - Transfer Case**
- **Diagnostic Starting Point - Rear Drive Axle** in Rear Drive Axle
- **Noisy in Drive**
- **Noisy When Coasting**
- **Intermittent Noise**
- **Constant Noise**
- **Transfer Case Leak Diagnosis**

NOISY IN DRIVE

Noisy in Drive

Cause	Correction
Inspect for the proper gear oil levels prior to performing system diagnosis.	
Loose propeller shaft constant velocity joints	Tighten the bolts as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Worn propeller shaft constant velocity joints	Replace the propeller shaft assembly. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft. A worn propeller shaft constant velocity joint may create a clicking, grinding, or snapping type of noise.
Worn or loose center bearing assembly	Replace the center bearing assembly as required. A worn center bearing assembly may cause vehicle vibration or a grinding or squealing type of noise.
Worn universal joints	Replace the universal joints as required. A worn universal joint may create a clicking or snapping type of noise.
Worn axle shaft constant	Replace/repair the constant velocity joints as required.

velocity joints	A worn axle constant velocity joint may create a clicking, grinding, or snapping type of noise.
Rear axle noise	Refer to <u>Diagnostic Starting Point - Transfer Case</u> .
Loose mounting bracket	Tighten the bracket bolt or replace the bracket as required.
Loose transfer case-to-transmission mounting bolts	Tighten the bolts as required.
Incorrect gear oil	Replace with GM gear oil Saturn P/N 12378514.
Bearing noise within the transfer case	<p>A grinding or roar type noise will increase or decrease relative to the vehicle speed.</p> <ul style="list-style-type: none"> • Check for proper fluid level. Fill as required. • If the noise continues, replace the unit.
Gear set whine noise within the transfer case	<p>Whine type noises will increase or decrease relative to the vehicle speed, approximately 80-90 km/h (50-60 mph).</p> <ol style="list-style-type: none"> 1. Check for the proper fluid level. Fill as required. 2. If the noise continues, repair or replace the internal components as required. <p>Contributing factors may include:</p> <ul style="list-style-type: none"> • Incorrect backlash between the gear sets • Worn or damaged gear teeth • Transaxle assembly noise • Rear axle noise

NOISY WHEN COASTING

Noisy When Coasting

Cause	Correction
Inspect for the proper gear oil levels prior to performing system diagnosis.	
Loose propeller shaft mounting bolts.	Tighten the bolts as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Worn propeller shaft constant velocity joint	<p>Replace the propeller shaft assembly. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.</p> <p>A worn propeller shaft constant velocity joint may create a clicking, grinding, or snapping type of noise.</p>
Worn or loose center bearing assembly	Replace the center bearing assembly as required. A worn center bearing assembly may cause vehicle vibration or a grinding or squealing type noise.
Worn universal joints	<p>Replace the universal joints as required.</p> <p>A worn universal joint may create a clicking or snapping type noise.</p>
Worn axle shaft constant	Replace/repair the constant velocity joints as required.

velocity joints	A worn axle shaft constant velocity joint may create a clicking, grinding, or snapping type noise.
Rear axle noise	Refer to <u>Diagnostic Starting Point - Rear Drive Axle</u> in Rear Drive Axle.
Loose mounting bracket	Tighten the bracket bolts or replace the bracket as required.
Loose transfer case-to-transmission mounting bolts.	Tighten the bolts as required.
Incorrect gear oil	Replace with GM gear oil Saturn P/N 12378514.
Bearing noise within the transfer case	A grinding or roar type noise will increase or decrease relative to the vehicle speed. <ul style="list-style-type: none"> • Check for proper fluid level. Fill as required. • If the noise continues, replace the unit.
Gear set whine noise within the transfer case	Whine type noises will increase or decrease relative to the vehicle speed, approximately 80-90 km/h (50-60 mph). <ol style="list-style-type: none"> 1. Check for proper fluid level. Fill as required. 2. If the noise continues, repair or replace the internal components as required. <p>Contributing factors may include:</p> <ul style="list-style-type: none"> • Incorrect backlash between the gear sets • Worn or damaged gear teeth • Transaxle assembly noise • Rear axle noise

INTERMITTENT NOISE

Intermittent Noise

Cause	Correction
Inspect for proper gear oil levels prior to performing system diagnosis.	
Loose propeller shaft mounting bolts	Tighten the bolts as required. Refer to <u>Propeller Shaft Replacement</u> in Propeller Shaft.
Loose mounting bracket	Tighten the bracket bolts or replace the bracket as required.
Loose transfer case-to-transaxle mounting bolts	Tighten the mounting bolts as required.

CONSTANT NOISE

Constant Noise

Cause	Correction
Inspect for proper gear oil levels prior to performing system diagnosis.	

Low gear oil levels	Faulty oil seals or other type leaks may contribute to lower than required fluid levels. Fill to the proper level with GM gear oil Saturn P/N 12368514.
Worn propeller shaft constant velocity joint	Replace propeller shaft assembly. Refer to Propeller Shaft Replacement in Propeller Shaft. A worn propeller shaft constant velocity joint may create a clicking, grinding, or snapping type noise.
Worn or loose center bearing assembly	Replace the center bearing assembly as required. A worn center bearing assembly may cause vehicle vibration or a grinding or squealing type noise.
Worn universal joints	Replace the universal joints as required. A worn universal joint may create a clicking or snapping type noise.
Worn axle shaft constant velocity joints	Replace./repair the constant velocity joints as required. A worn axle shaft constant velocity joint may create a clicking, grinding, or snapping type noise.
Bearing noise within transfer case	A grinding or roar type noise will increase or decrease relative to vehicle speed. <ul style="list-style-type: none"> • Check for proper fluid level. Fill as required. • If the noise continues, repair or replace the unit.
Gear set whine noise within carrier assembly	A whine type noise will increase or decrease relative to vehicle speed, approximately 80-90 km/h (50-60 mph). <ol style="list-style-type: none"> 1. Check for proper fluid level. Fill as required. 2. If the noise continues, repair or replace the internal components as required. <p>Contributing factors may include:</p> <ul style="list-style-type: none"> • Incorrect backlash between gear sets • Worn or damaged gear teeth • Transaxle assembly noise • Rear axle noise

TRANSFER CASE LEAK DIAGNOSIS

Transfer Case Leak Diagnosis

Cause	Correction
Leaking differential side seals	<ol style="list-style-type: none"> 1. Remove the transfer case. 2. Replace the differential side seals.
Leak around pinion flange	Replace the pinion seals.
Leaking drain and/or fill plugs	<ol style="list-style-type: none"> 1. Inspect for sealer and proper torque. 2. Drain the fluid. 3. Clean the plugs.

4. Replace the sealer.
5. Fill the transfer case with fluid.

REPAIR INSTRUCTIONS

AXLE SHAFT OIL SEAL REPLACEMENT

Tools Required

J 44809 Output Shaft Seal Installer

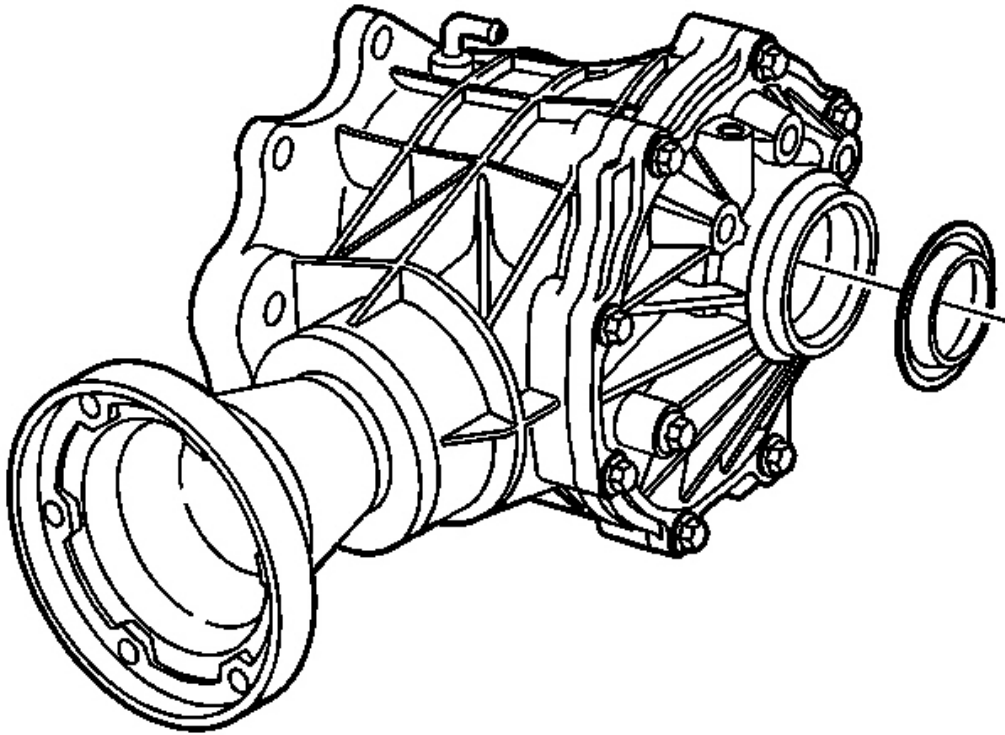


Fig. 2: Output Shaft Seal
Courtesy of GENERAL MOTORS CORP.

1. Carefully pry out the output shaft seal and discard.
2. Remove the old seal material from the seal bore area by cleaning the area.

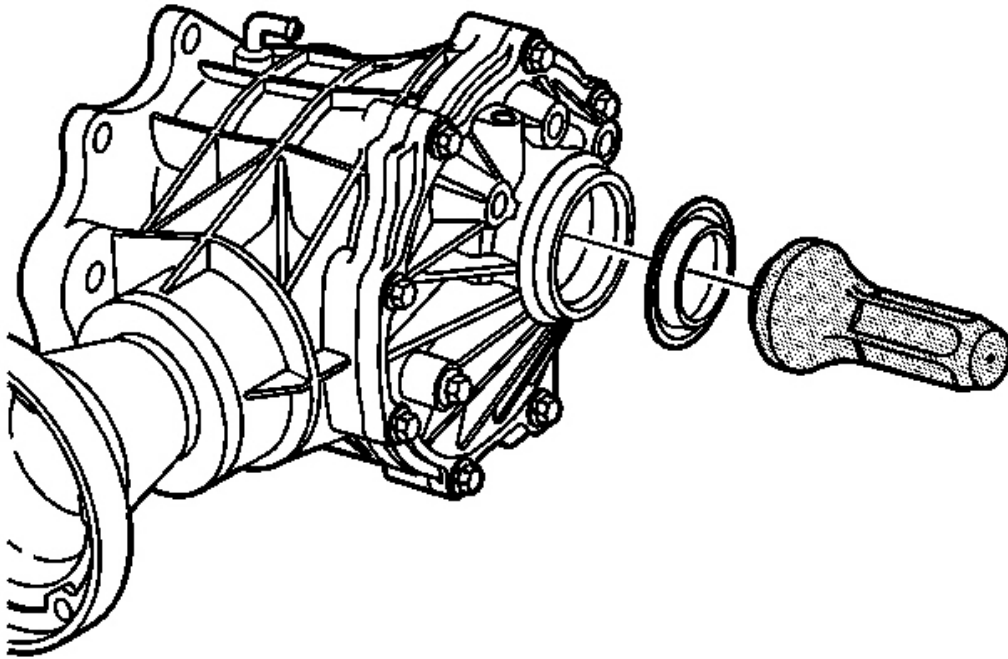


Fig. 3: Installing Output Shaft Seal Using J44809
Courtesy of GENERAL MOTORS CORP.

3. Using the **J 44809** , install the NEW output shaft seal.
4. Check the fluid level. Fluid level should be to the bottom of the fill plug hole threads.
5. Clean the drain plug.

NOTE: Refer to Fastener Notice in Cautions and Notices.

6. Install the fill plug. Apply sealant Saturn P/N 21005994 to the threads.

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

PINION OIL SEAL REPLACEMENT

Tools Required

- **J 44872** Pinion Shaft Seal Installer. See Special Tools and Equipment .
- **J 44873** Shoulder Bolts
- **J 44882** Pinion Press Support Bar. See Special Tools and Equipment .

Removal Procedure

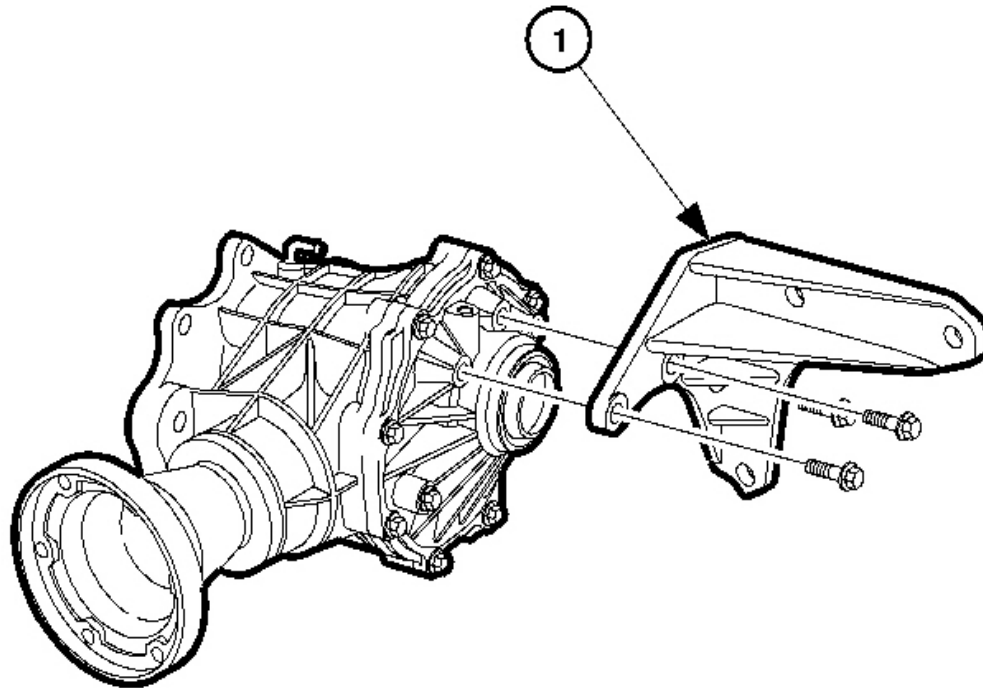


Fig. 4: Differential Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the 3 bolts from the bracket (1).
2. Remove the bracket (1).

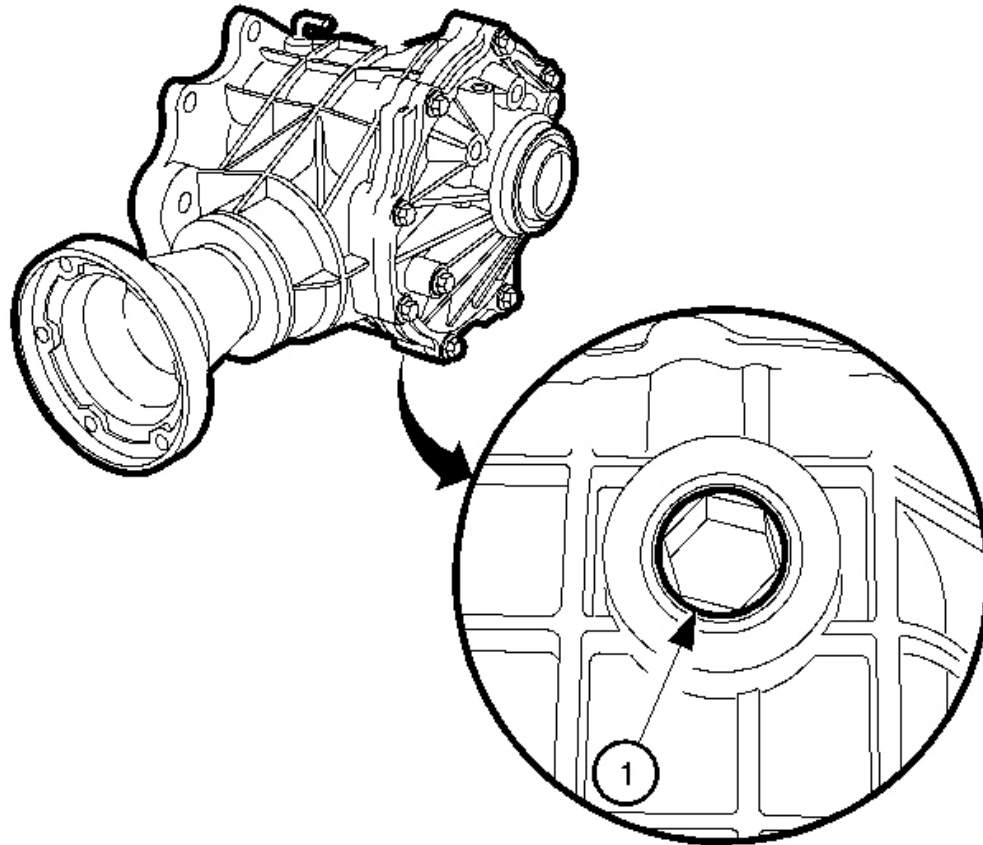


Fig. 5: Removing Drain Plug
Courtesy of GENERAL MOTORS CORP.

3. Remove the drain plug (1).

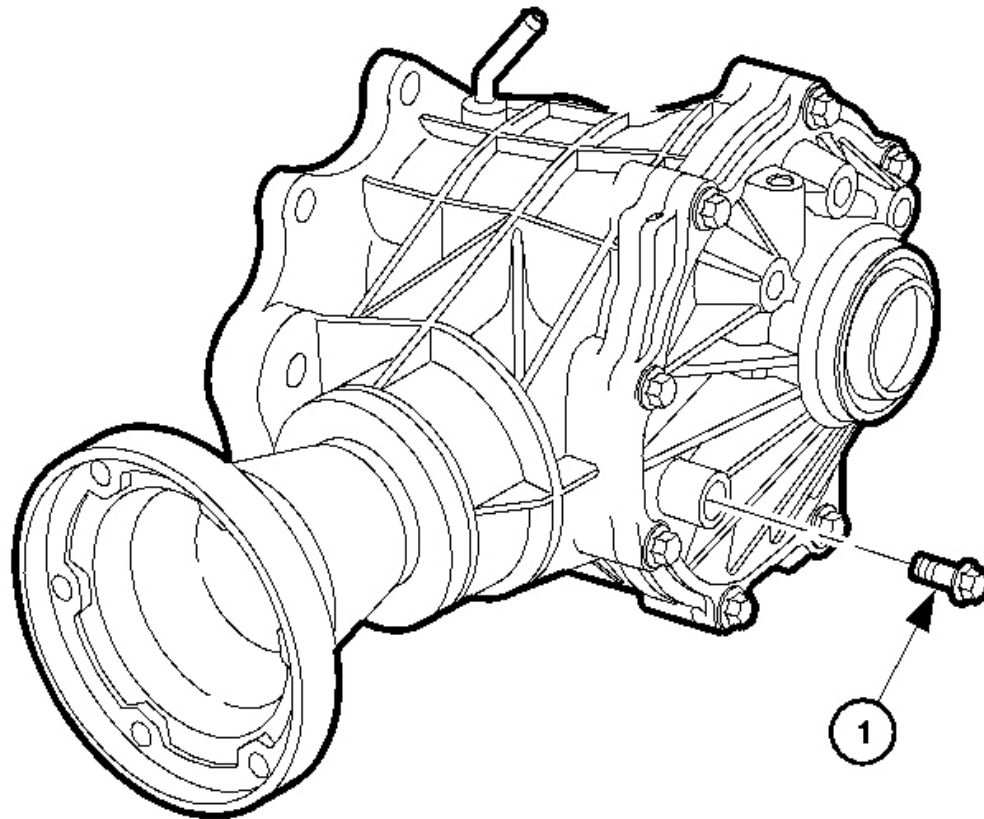


Fig. 6: Removing Fill Plug
Courtesy of GENERAL MOTORS CORP.

4. Remove the fill plug (1) and drain the fluid.

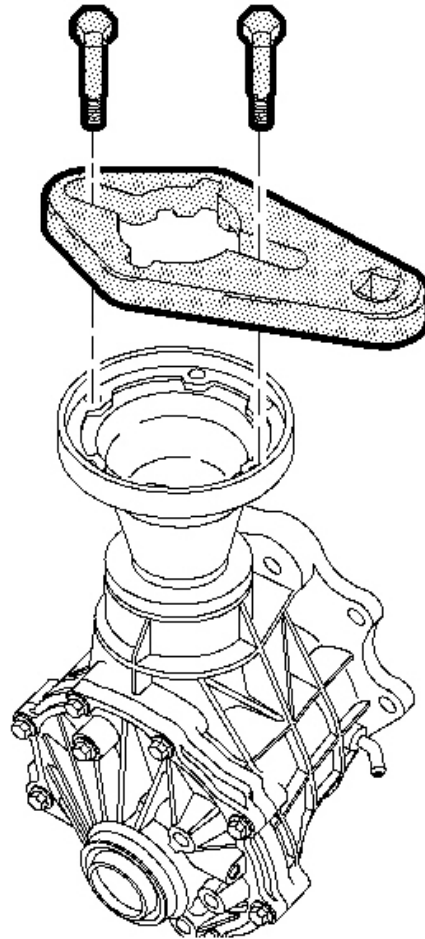


Fig. 7: Installing J44873 & 2 Attaching Bolts
Courtesy of GENERAL MOTORS CORP.

5. Install **J 44873** and the 2 attaching bolts to the pinion flange.

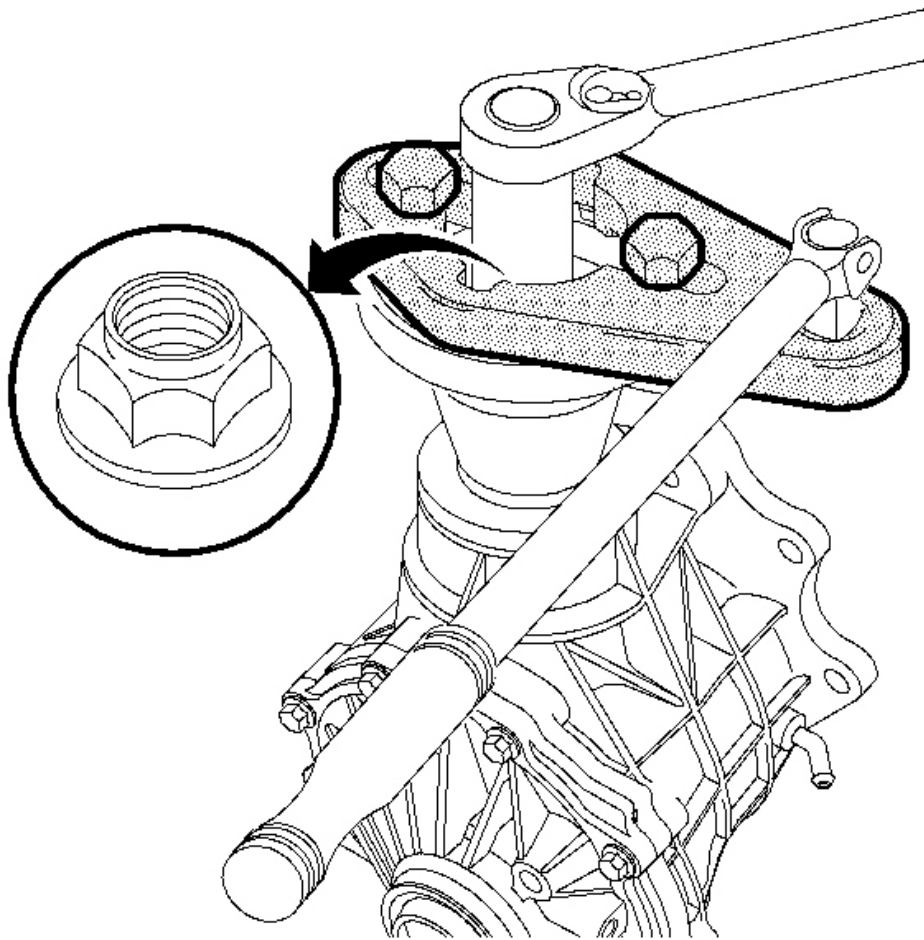


Fig. 8: Removing Pinion Nut Using Breaker Bar & Ratchet 27 mm Socket
Courtesy of GENERAL MOTORS CORP.

6. Using a breaker bar and a ratchet with a 27 mm socket, remove the pinion nut.

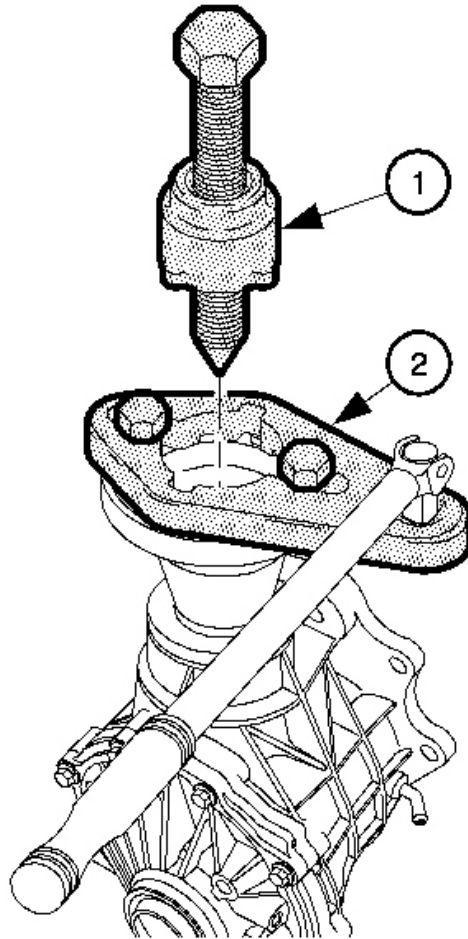


Fig. 9: Using J8614-01
Courtesy of GENERAL MOTORS CORP.

7. Insert J 8614-01 (1) through the slots in **J 44873** .
8. Turn the blue collar until it locks into the grooves on the underside of the **J 44873** .

IMPORTANT: Use high pressure grease on the screw threads.

9. Tighten the forcing screw to remove the pinion flange.

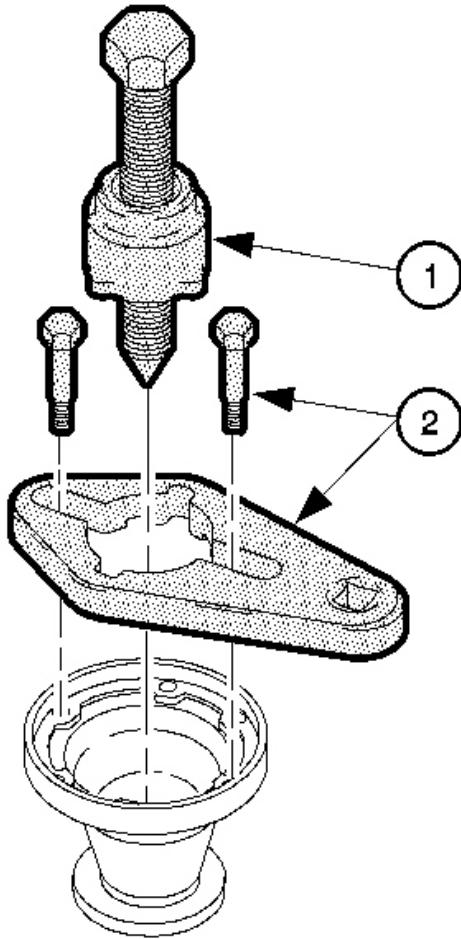


Fig. 10: Removing J44873
Courtesy of GENERAL MOTORS CORP.

10. Remove the **J 44873** (2), the 2 attaching bolts and J 8614-01 (1) from the pinion flange.

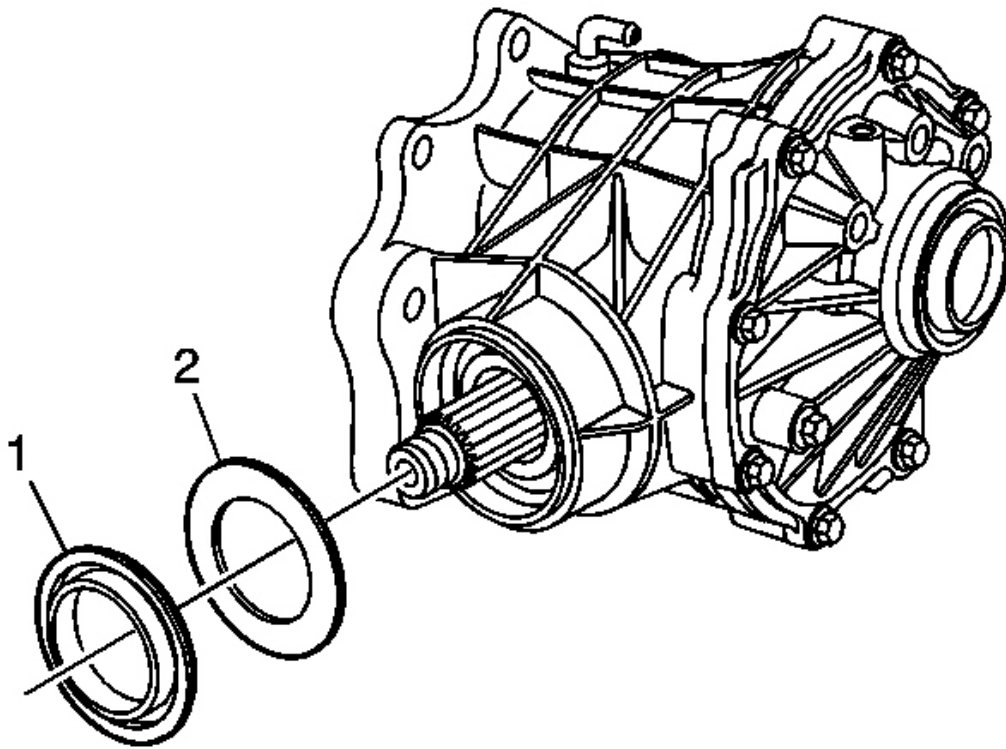


Fig. 11: Removing Oil Seal & Slinger Washer
Courtesy of GENERAL MOTORS CORP.

11. Remove the oil seal (1) and slinger washer (2) from the housing.

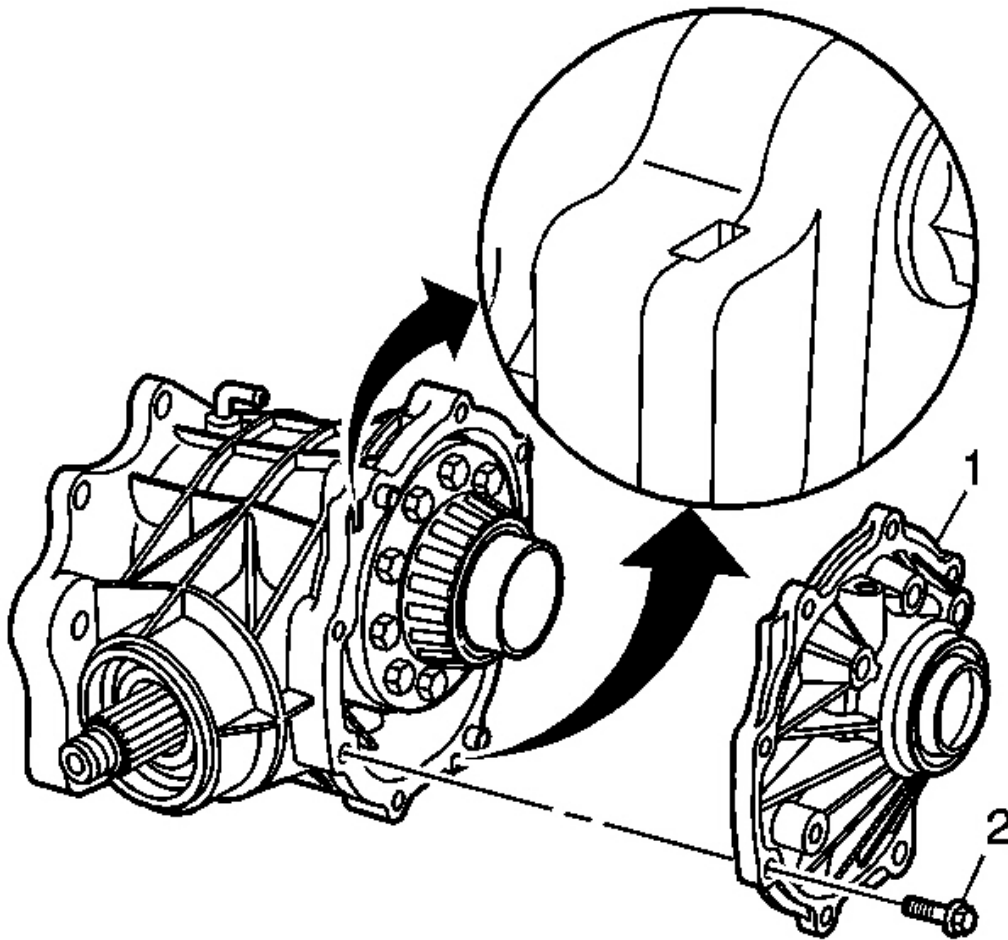


Fig. 12: Removing Bolts From The Side Cover
Courtesy of GENERAL MOTORS CORP.

12. Remove all bolts (2) from the side cover (1).
13. Use the pry point relief slots to remove the cover.

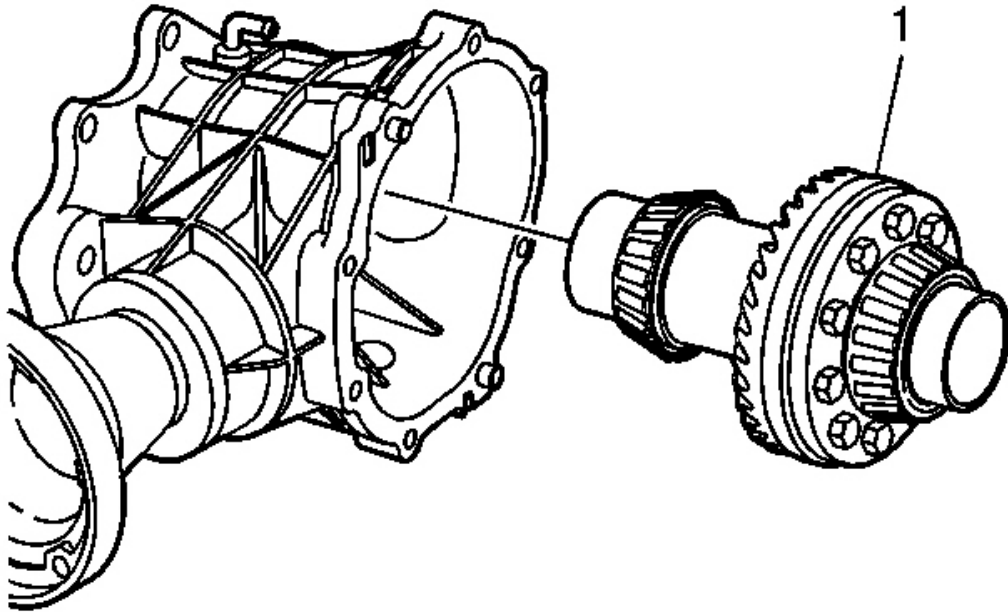


Fig. 13: Removing/Installing Carrier Assembly From The Housing
Courtesy of GENERAL MOTORS CORP.

14. Remove the carrier assembly (1) from the housing.

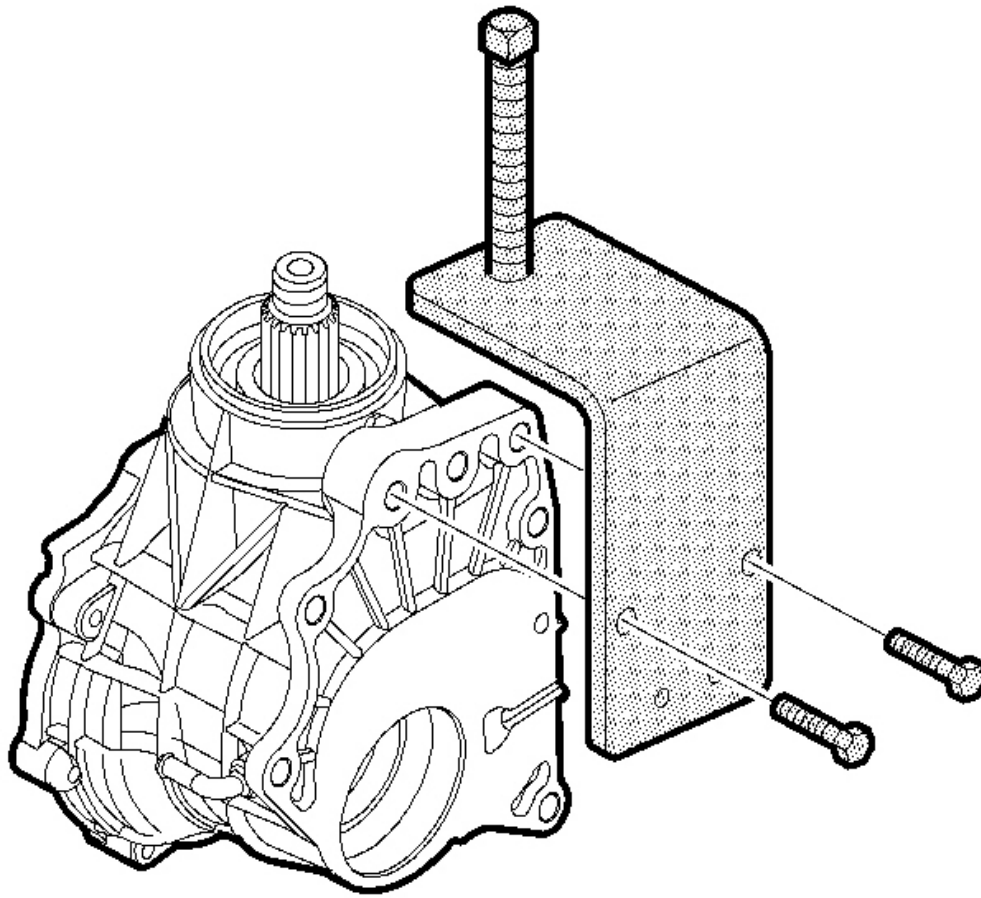


Fig. 14: Using Bolts & Attaching J44882
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not use air tools. The use of an air tool will damage the J44882.

IMPORTANT: Use high pressure grease on the threads of the forcing screw.

15. Using the bolts supplied, attach **J 44882** to the carrier housing. See Special Tools and Equipment .

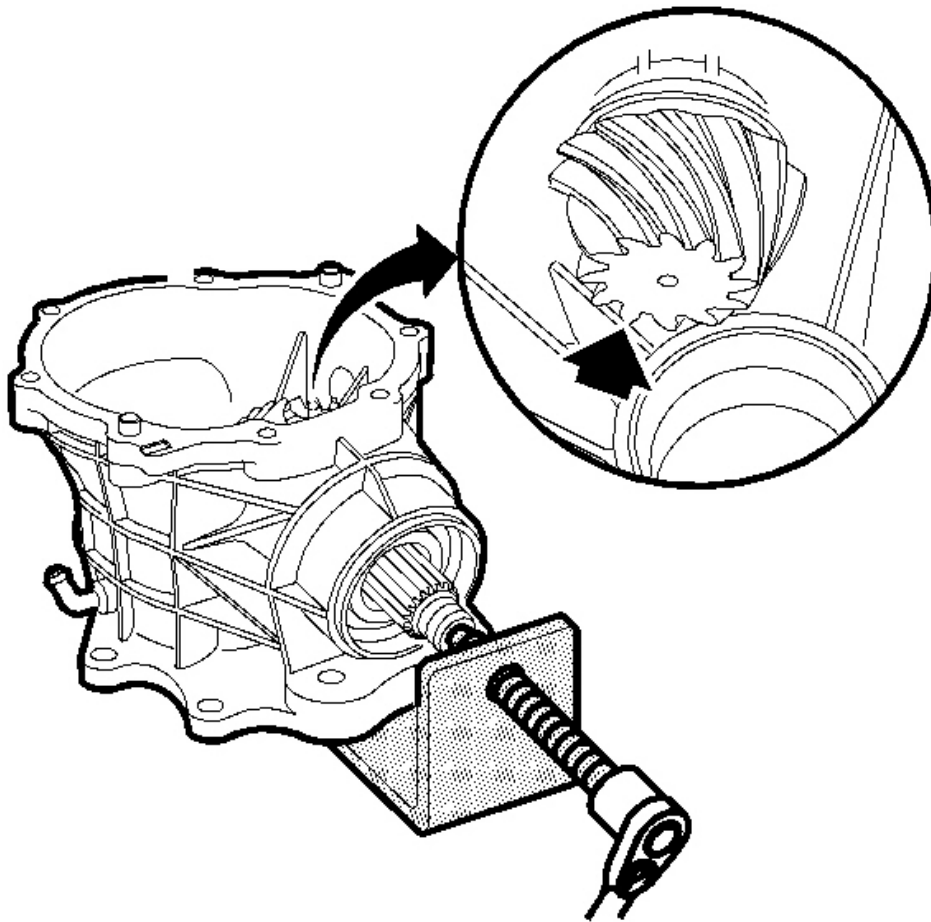


Fig. 15: Removing J44882
Courtesy of GENERAL MOTORS CORP.

16. Tighten the forcing screw in order to push out the pinion gear. The gear will spin when it is being pushed out. When the gear stops spinning, stop pushing. The gear teeth will contact the housing.
17. Remove the **J 44882** . See **Special Tools and Equipment** .

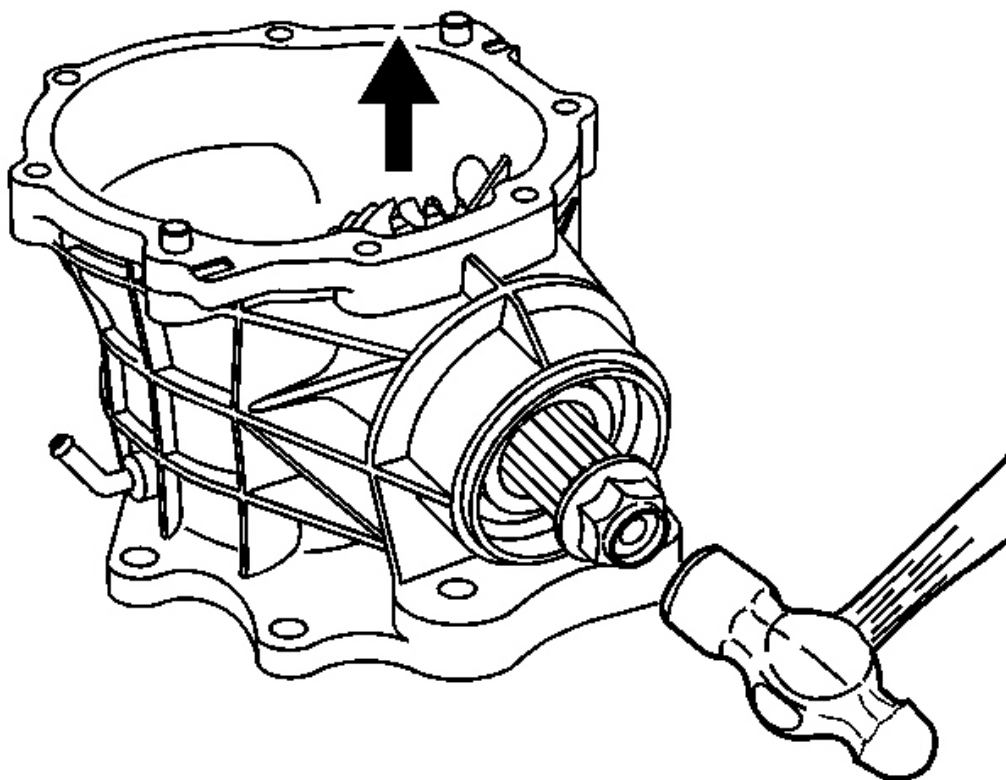


Fig. 16: Installing Pinion Nut On The Threads Of The Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

18. Install the old pinion nut on the threads of the pinion shaft. Hold the shaft so the gear head faces up and drive out the pinion shaft so that it does not contact the housing.

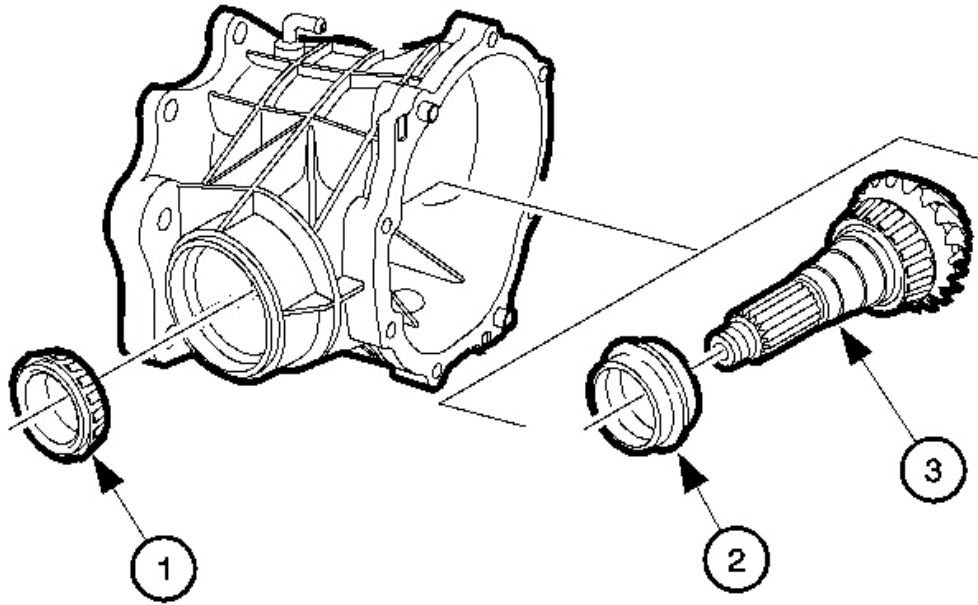


Fig. 17: Removing/Installing Collapsible Spacer, Pinion Shaft & Bearing Onto The Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

19. Remove the bearing (1), collapsible spacer (2), and pinion shaft (3) from the housing.

Installation Procedure

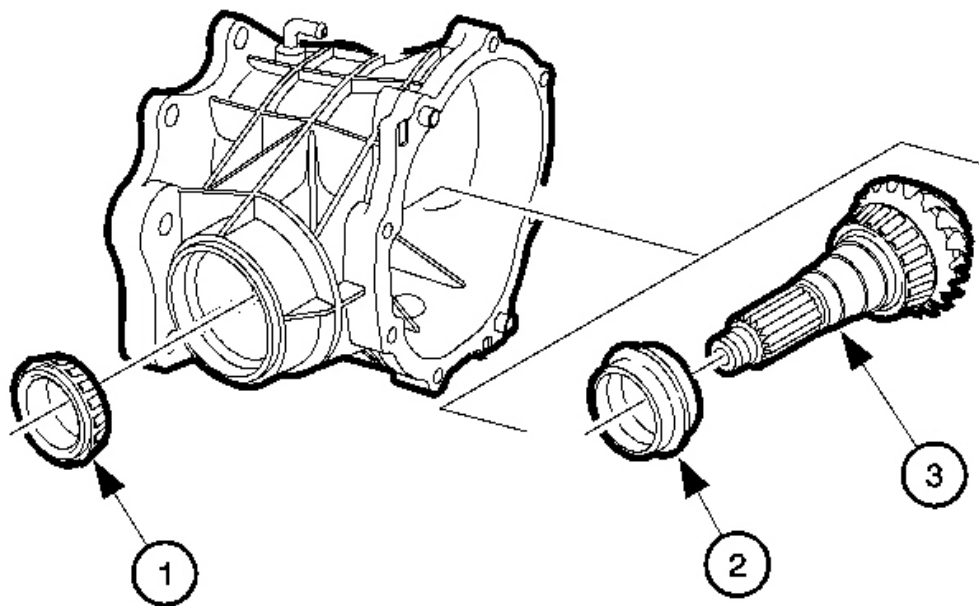


Fig. 18: Removing/Installing Collapsible Spacer, Pinion Shaft & Bearing Onto The Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

1. Install the NEW collapsible spacer (2) onto the pinion shaft (3).
2. Install the pinion shaft (3) into the housing.
3. Install the bearing (1) onto the pinion shaft.

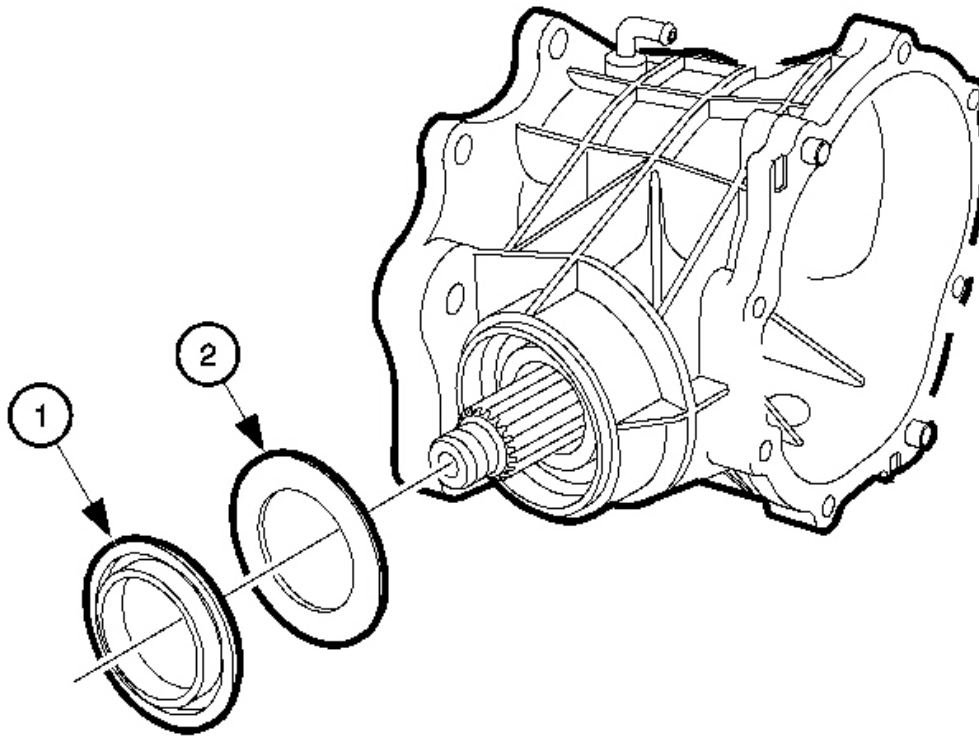


Fig. 19: Installing Slinger Washer & Pinion Seal
Courtesy of GENERAL MOTORS CORP.

4. Install the slinger washer (2) and the NEW pinion seal (1) to the housing.

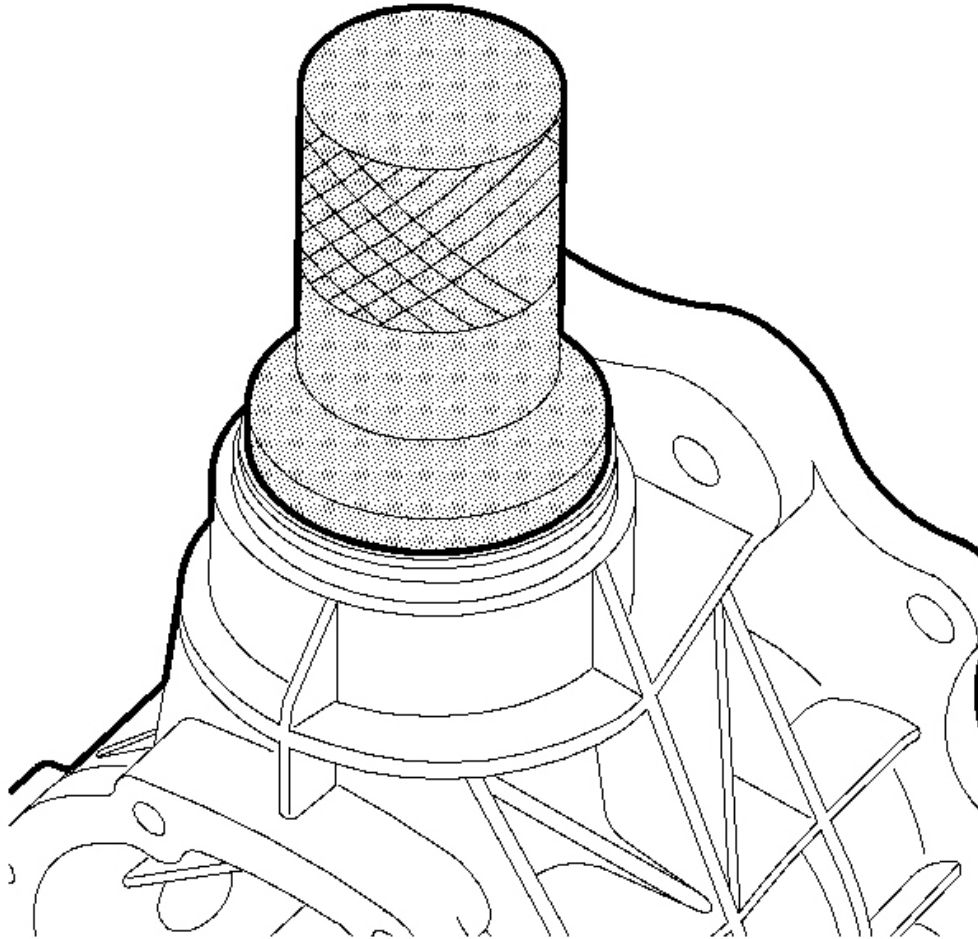


Fig. 20: Installing Pinion Seal Using J44872
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Clean the seal bores. Inspect for nicks caused by seal removal.

5. Using the **J 44872** , install the NEW pinion seal. See **Special Tools and Equipment** .

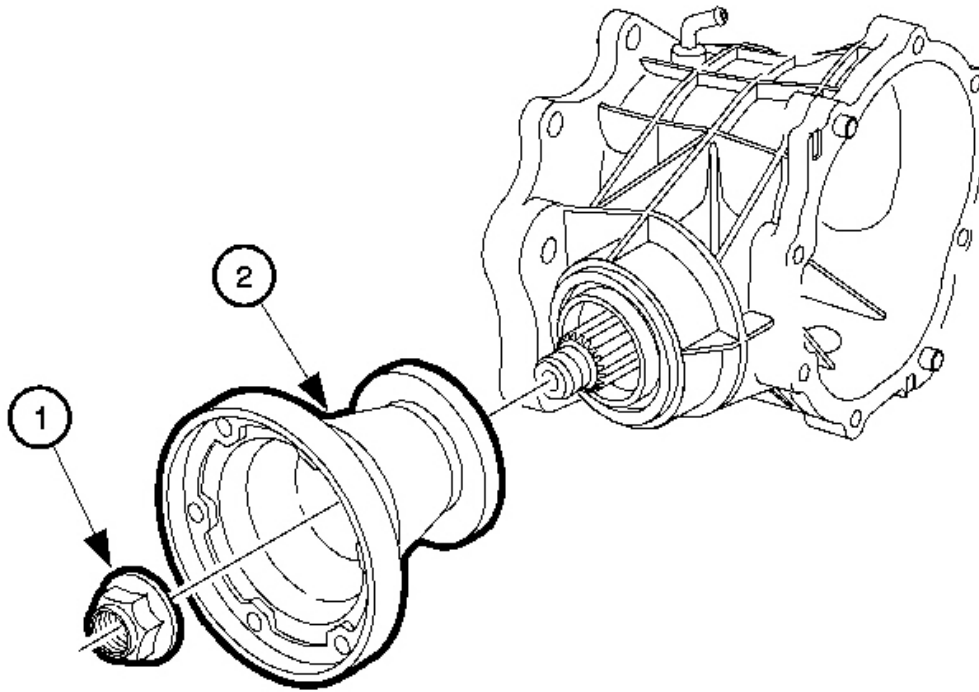


Fig. 21: Installing Pinion Flange Using Pinion Nut
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Use a NEW pinion nut.

6. Using a NEW pinion nut (1), install the pinion flange (2) to the pinion shaft.

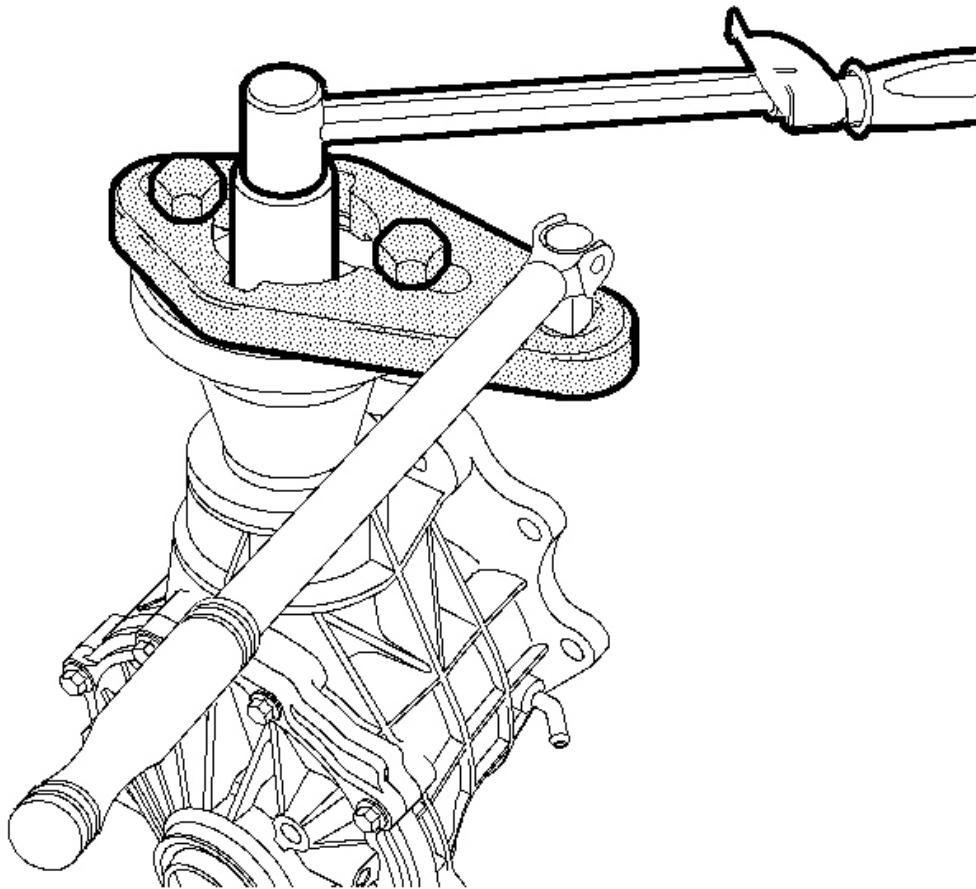


Fig. 22: Installing J44873 & 2 Bolts In Order To Hold The Pinion Flange
Courtesy of GENERAL MOTORS CORP.

7. Install J 44873 and the 2 bolts supplied in order to hold the pinion flange while tightening the nut.
8. Tighten the pinion flange nut until it is snug.

NOTE: Refer to Fastener Notice in Cautions and Notices.

9. Tighten the nut slowly in order to crush the collapsible spacer.

Tighten: Tighten the pinion flange nut to achieve a rotating torque of 0.9-1.6 N.m (8-14 lb in).

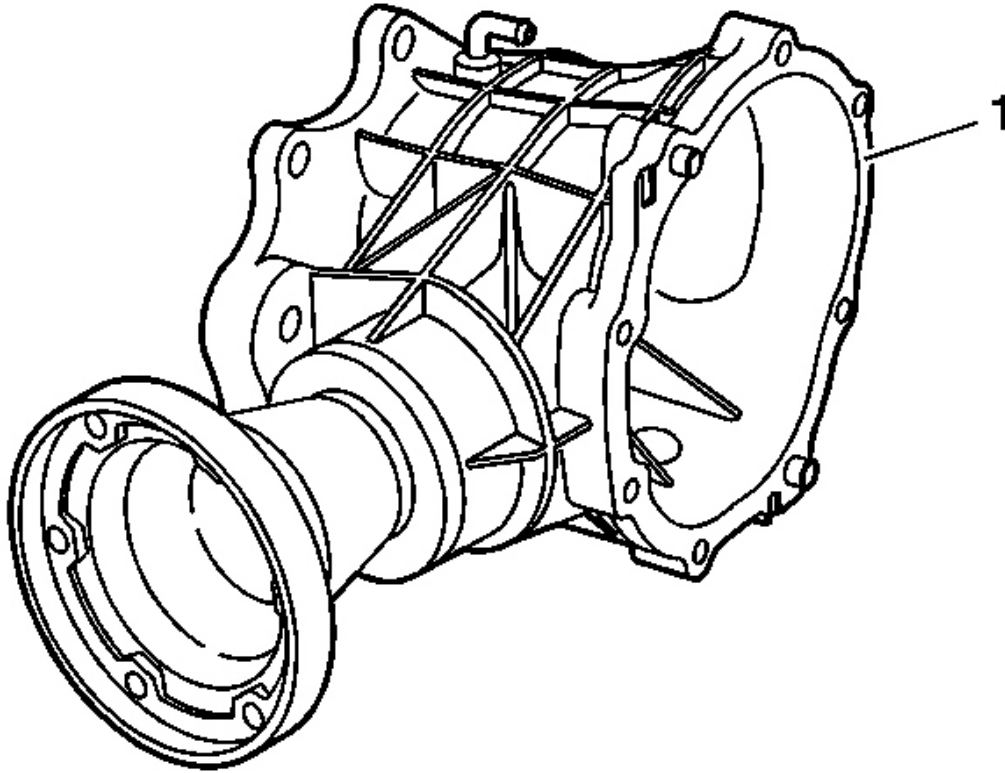


Fig. 23: Cleaning Carrier Assembly Housing Sealing Surface
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not use motor-powered tools to clean surfaces.

10. Clean the carrier assembly housing sealing surface (1) with solvent and scrape it clean with a razor blade.

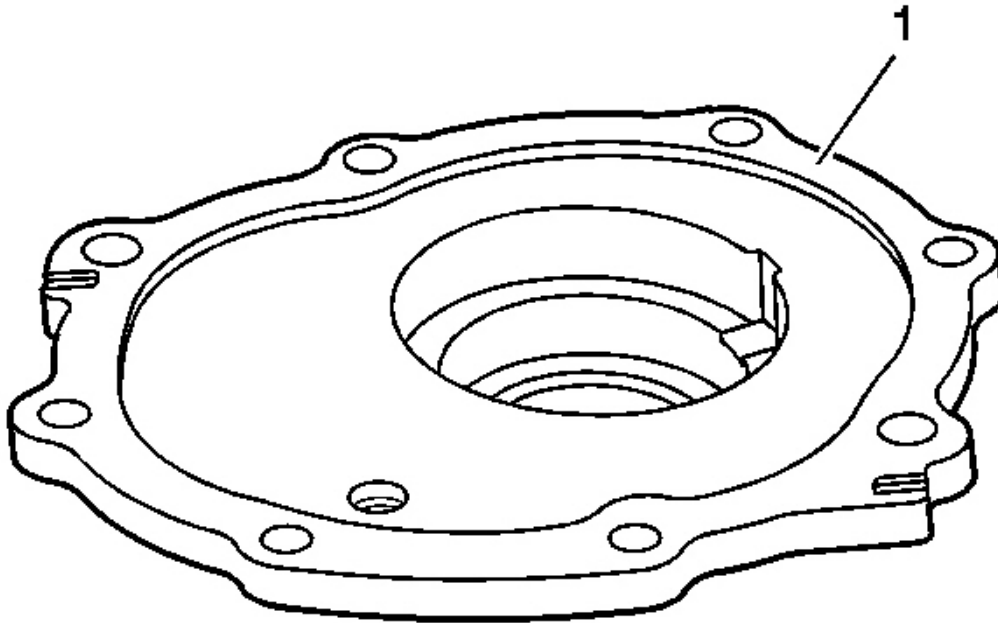


Fig. 24: Cleaning Cover Sealing Surface
Courtesy of GENERAL MOTORS CORP.

11. Clean the cover sealing surface (1) with solvent and scrape it clean with a razor blade.

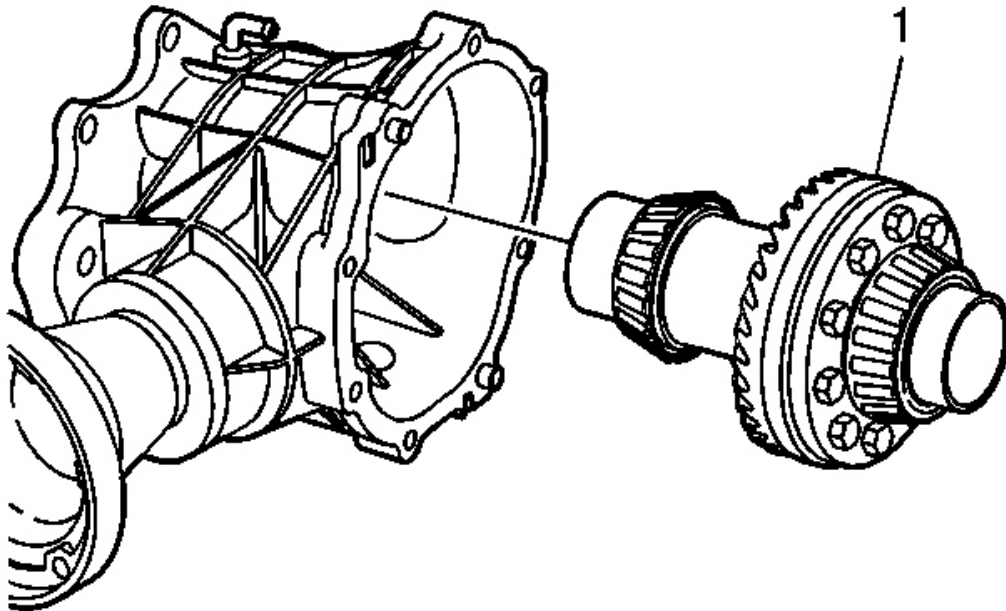


Fig. 25: Removing/Installing Carrier Assembly From The Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Use gear lubricant fluid Saturn P/N 12378514 to grease the seal lips in order to protect the seal and to ease in assembly.

12. Install the carrier assembly (1) to the housing.

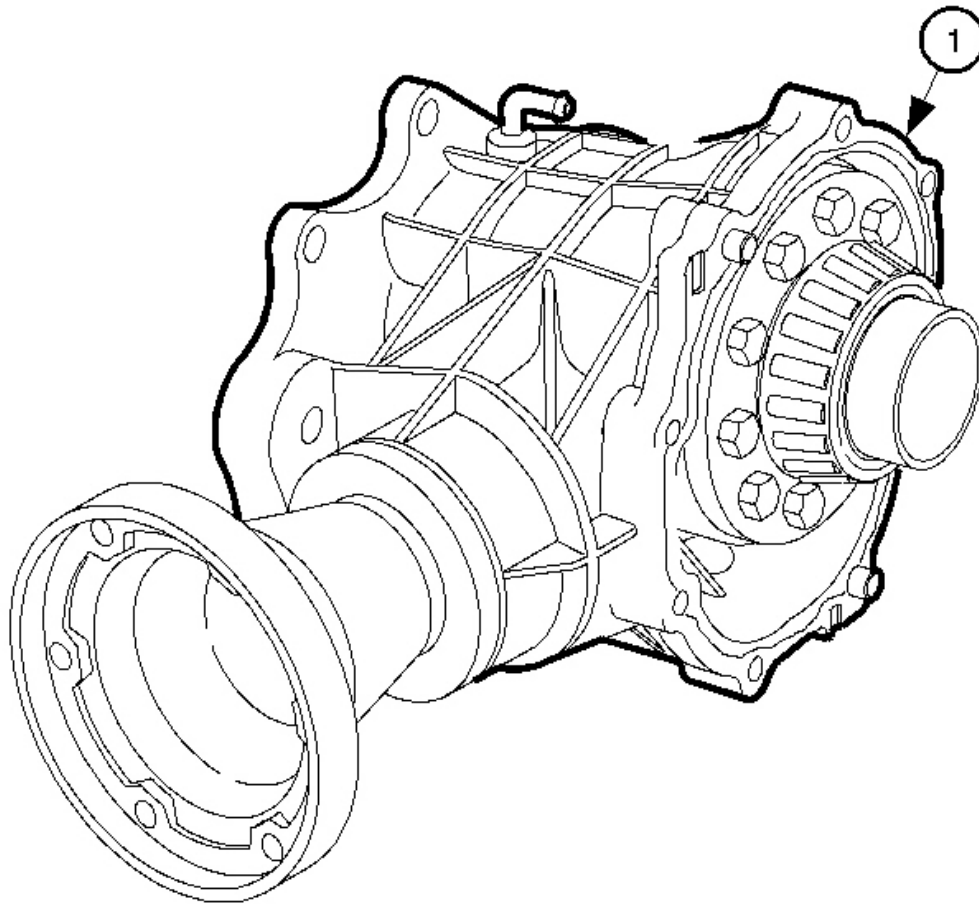


Fig. 26: Applying Sealer To Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not apply excess sealer. Excess sealer could cause premature failure.

13. Apply a 2-3 mm (0.08-0.12 in) amount of sealer Saturn P/N 1052943 or equivalent to the housing (1).

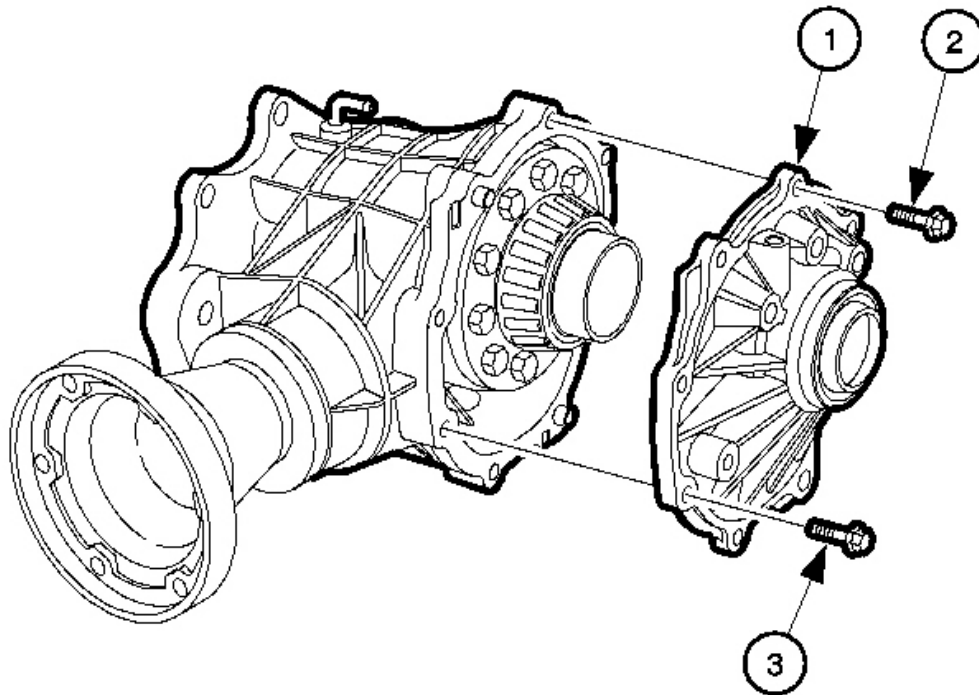


Fig. 27: Installing Side Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Grease the seal lips in order to protect the seal and to ease in assembly.
Coat the bolt threads with sealant Saturn P/N 12345382.

14. Install the side cover (1) and bolts (2 and 3) to the housing.

There is not a specific tightening sequence, but the bolts with dowel pins should be tightened first, and alternate the others from side to side.

Tighten: Tighten the side cover bolts to 37 N.m (27 lb ft).

15. Install the drain plug. Apply sealant Saturn P/N 21485278 to the threads.

Tighten: Tighten the drain plug to 24 N.m (18 lb ft).

16. Fill the transfer case with fluid, after it is installed in the vehicle, to the bottom of the fill plug hole, or 540 ml (18.2 oz).

17. Install the fill plug. Apply sealant Saturn P/N 21005994 to the threads.

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

DIFFERENTIAL CARRIER SEAL REPLACEMENT

Tools Required

- **J 44871** Hub Seal Installer. See **Special Tools and Equipment** .
- **J 44875** Right Bearing Race Installer. See **Special Tools and Equipment** .

Removal Procedure

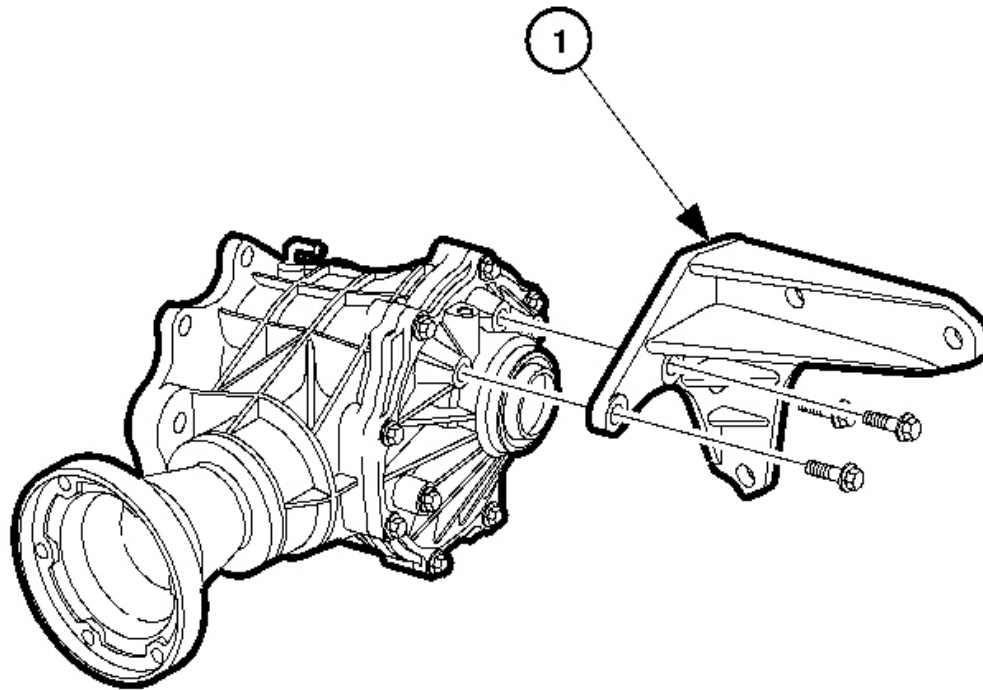


Fig. 28: Differential Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the 3 bolts from the bracket (1).
2. Remove the bracket (1).

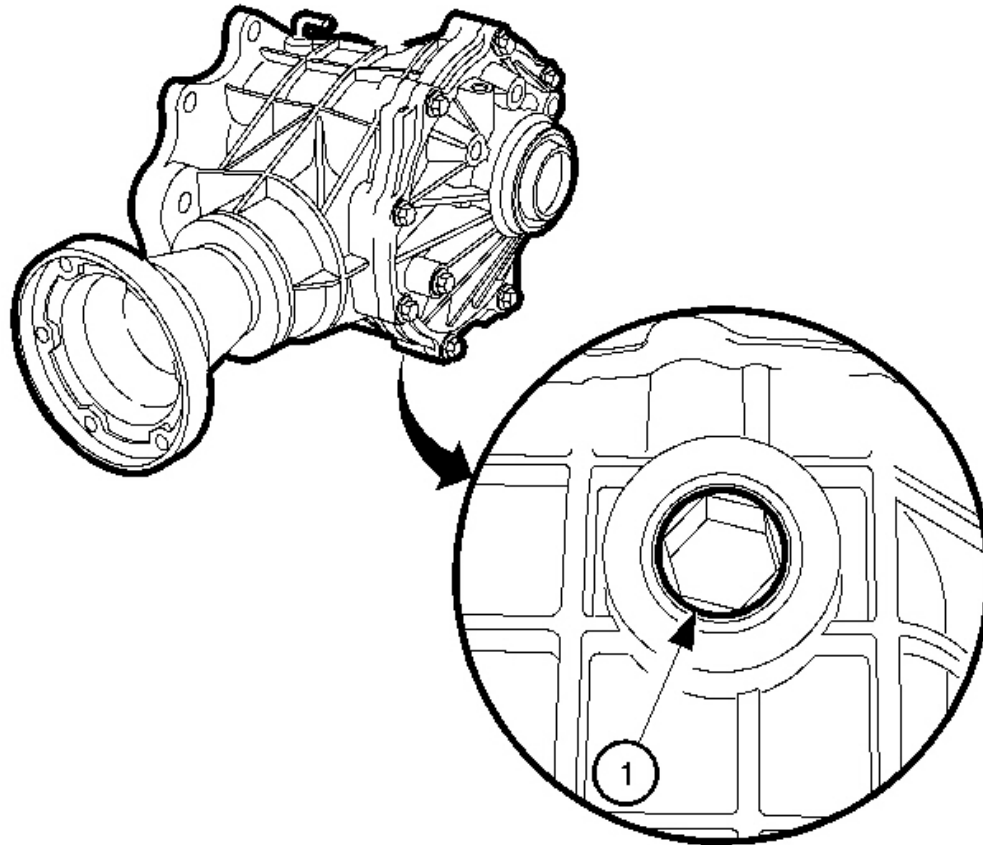


Fig. 29: Removing Drain Plug
Courtesy of GENERAL MOTORS CORP.

3. Remove the drain plug (1).

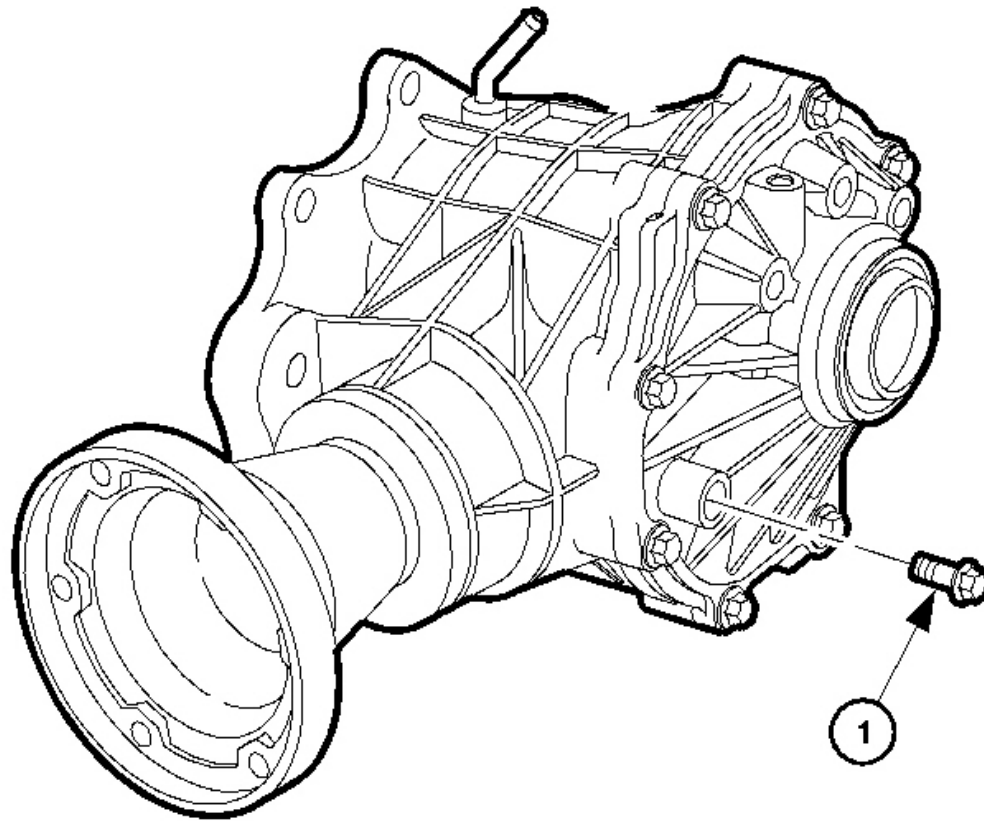


Fig. 30: Removing Fill Plug
Courtesy of GENERAL MOTORS CORP.

4. Remove the fill plug (1) and drain the fluid.

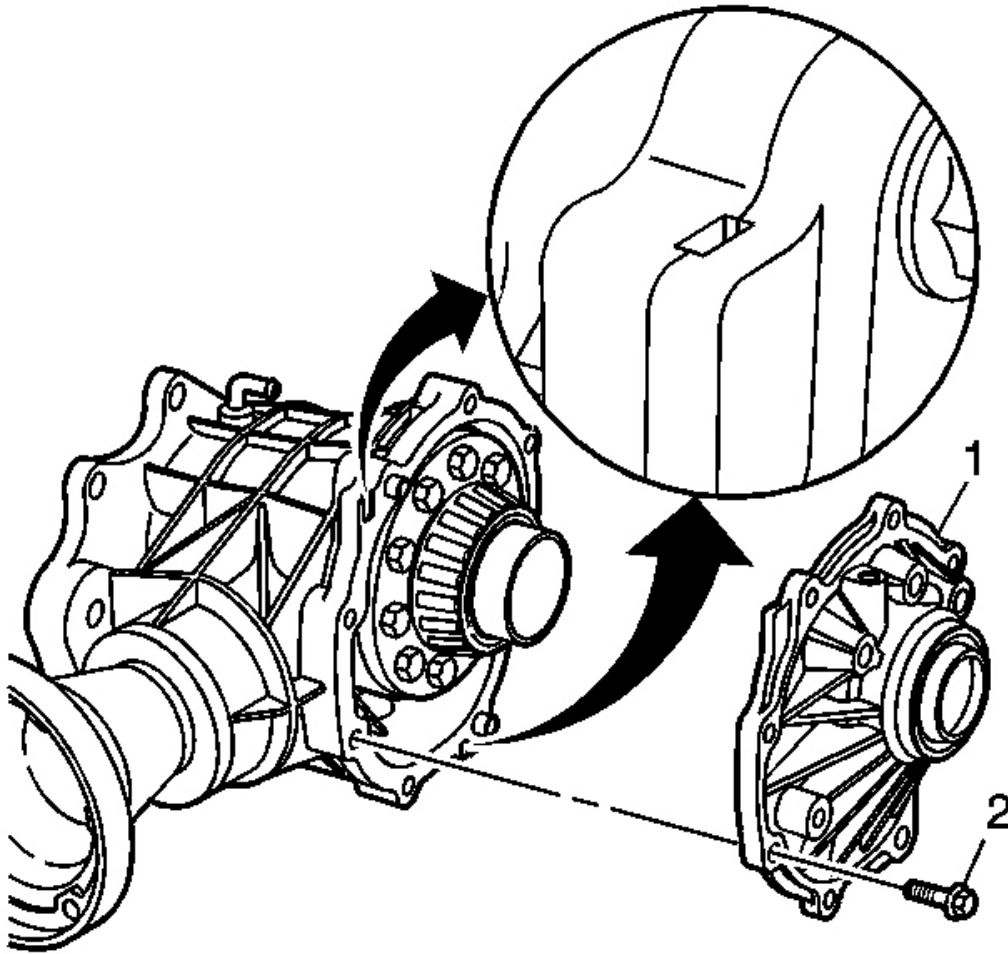


Fig. 31: Removing Bolts From The Side Cover
Courtesy of GENERAL MOTORS CORP.

5. Remove all bolts (2) from the side cover (1).
6. Use the pry point relief slots to remove the cover.

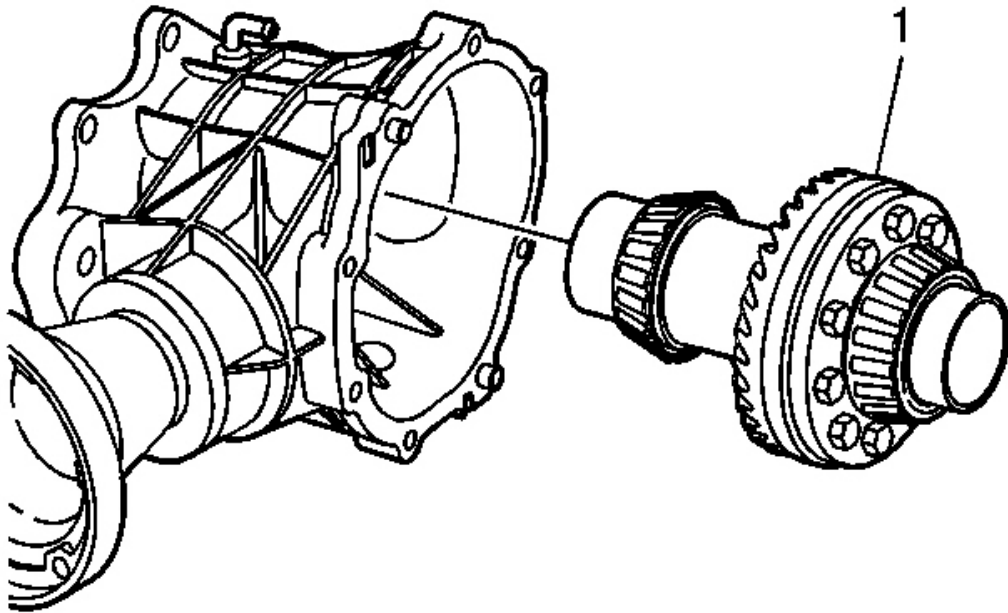


Fig. 32: Removing/Installing Carrier Assembly From The Housing
Courtesy of GENERAL MOTORS CORP.

7. Remove the carrier assembly (1) from the housing.

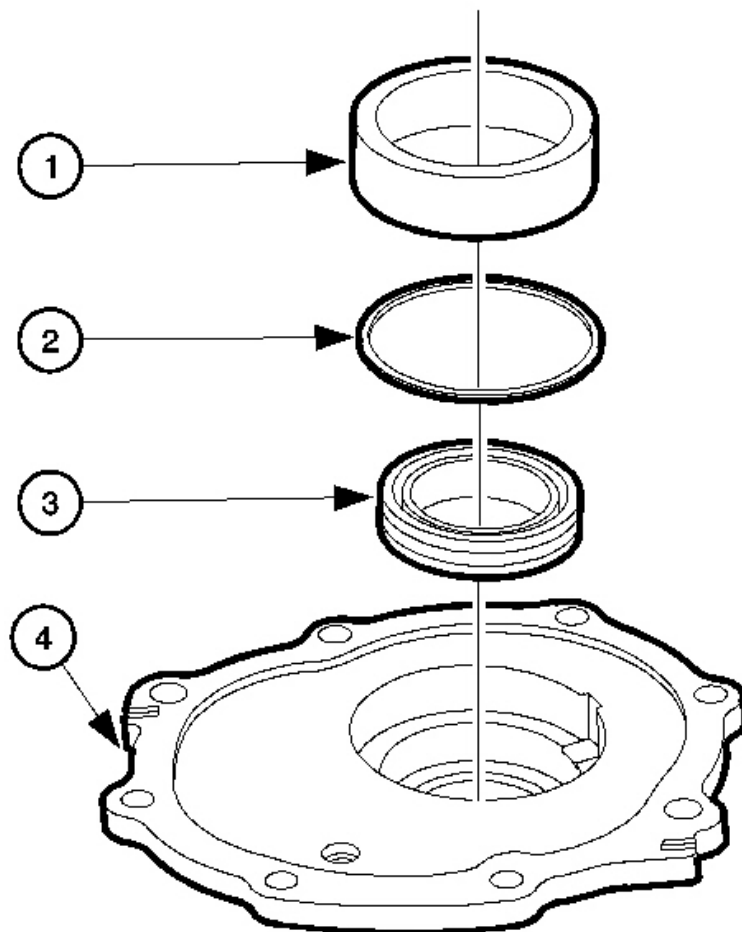


Fig. 33: Removing Bearing Cup, Shims, and Seal From The Cover
Courtesy of GENERAL MOTORS CORP.

NOTE: The bearing cup shims must be removed before the seal can be removed. Installing the seal through the bearing cup will damage the new seal. It may be necessary to heat the housing in order to remove the cup.

8. Remove the bearing cup (1), shims (2) and seal (3) from the cover (4). Mark or tag the cup (1) and shims (2) for proper assembly.

Installation Procedure

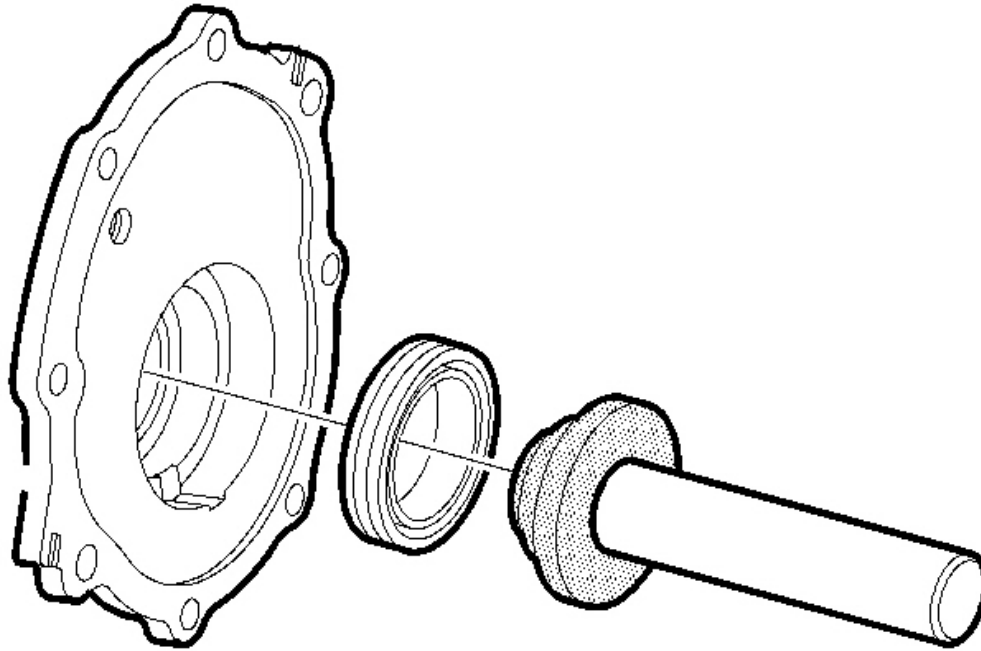


Fig. 34: Installing Inner Oil Seal Using J44871 & Driver Handle
Courtesy of GENERAL MOTORS CORP.

NOTE: The bearing cup must be removed in order to install the seal. If the bearing cup is not removed first, seal damage may occur.

IMPORTANT: Clean the seal bores before installing the new seals. Inspect the bores for nicks caused by seal removal.

1. Using **J 44871** and a driver handle, install the inner oil seal into the cover. See **Special Tools and Equipment** .

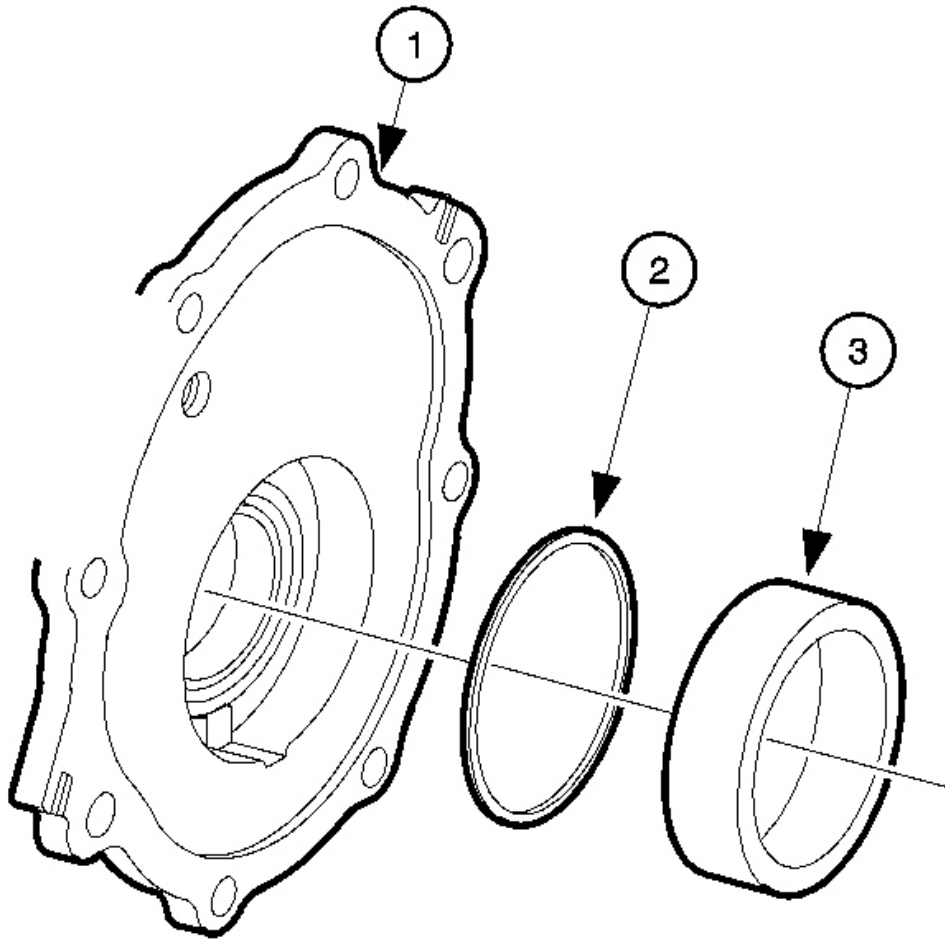


Fig. 35: Installing Shim & Bearing Cup
Courtesy of GENERAL MOTORS CORP.

2. Install the shim (2) and the bearing cup (3) into the side cover (1).

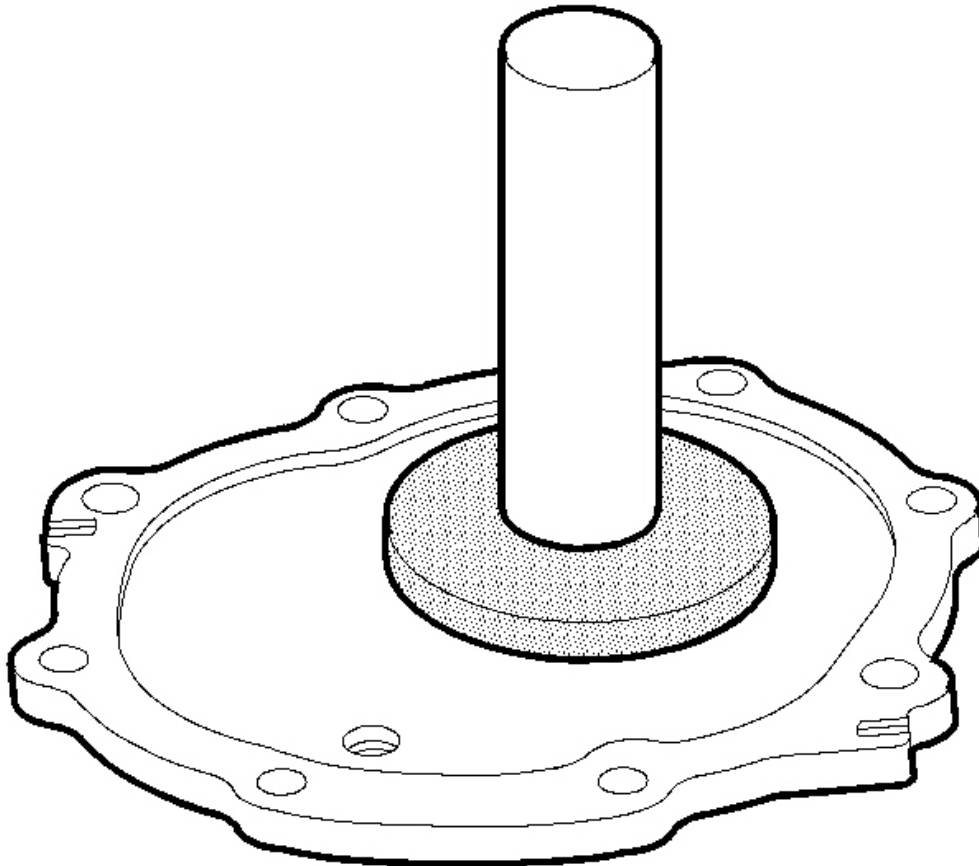


Fig. 36: Installing Cup & Shim Using J44875
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not heat the cover to install the cup. Heating the cover will damage the seal.

3. Using **J 44875** and a driver handle, install the cup and the shim. See **Special Tools and Equipment** .

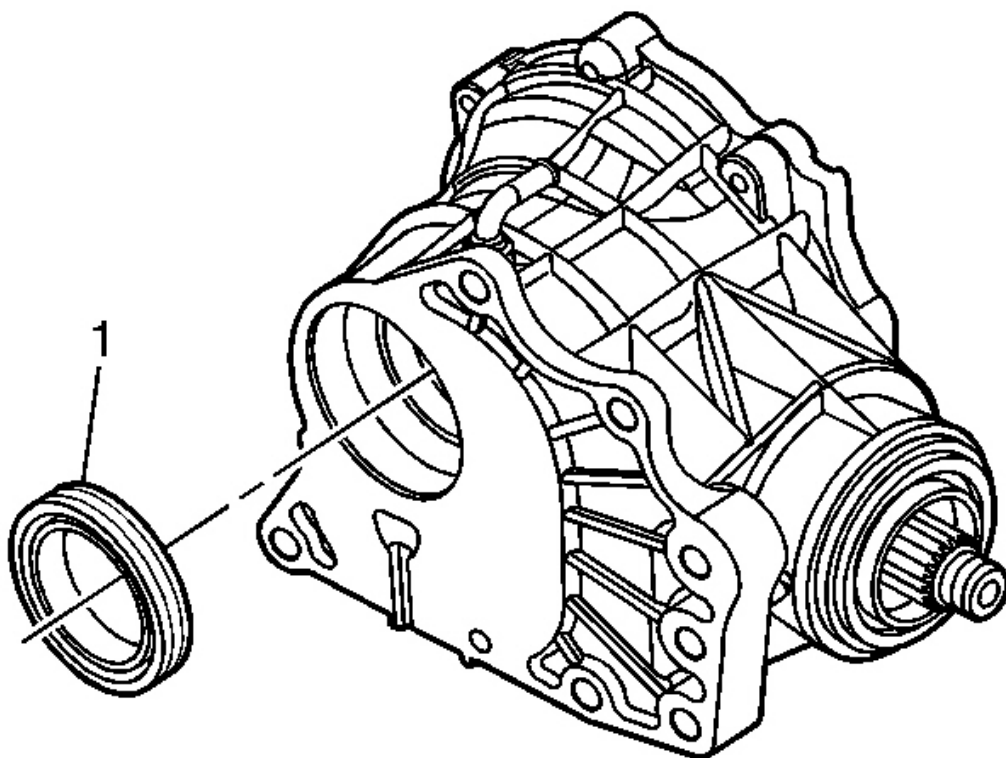


Fig. 37: Removing Bearing Cup or Shims In Order To Remove Seal From Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: It is not necessary to remove the bearing cup or shims in order to remove the seal from the carrier assembly housing.

4. Drive the seal (1) out from the inside of the carrier assembly housing.

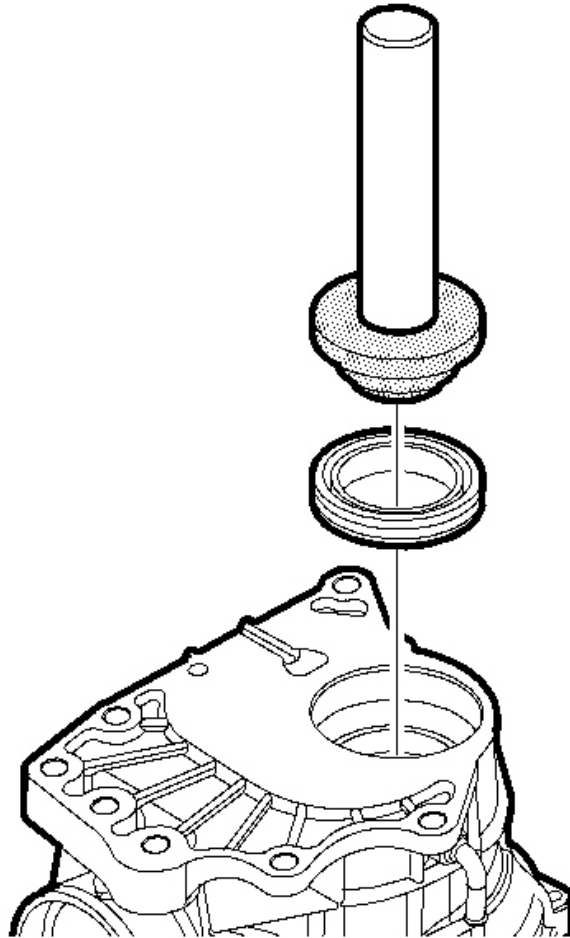


Fig. 38: Installing Oil Seal On The Housing Using J44871
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not install the seal from inside of the housing. The outside diameter of the bearing cup may cause seal damage.

IMPORTANT: Clean the seal bores before installing new seals. Inspect the bores for nicks caused by seal removal.

5. Using **J 44871** and a driver handle, install the oil seal to the housing. See **Special Tools and Equipment** .

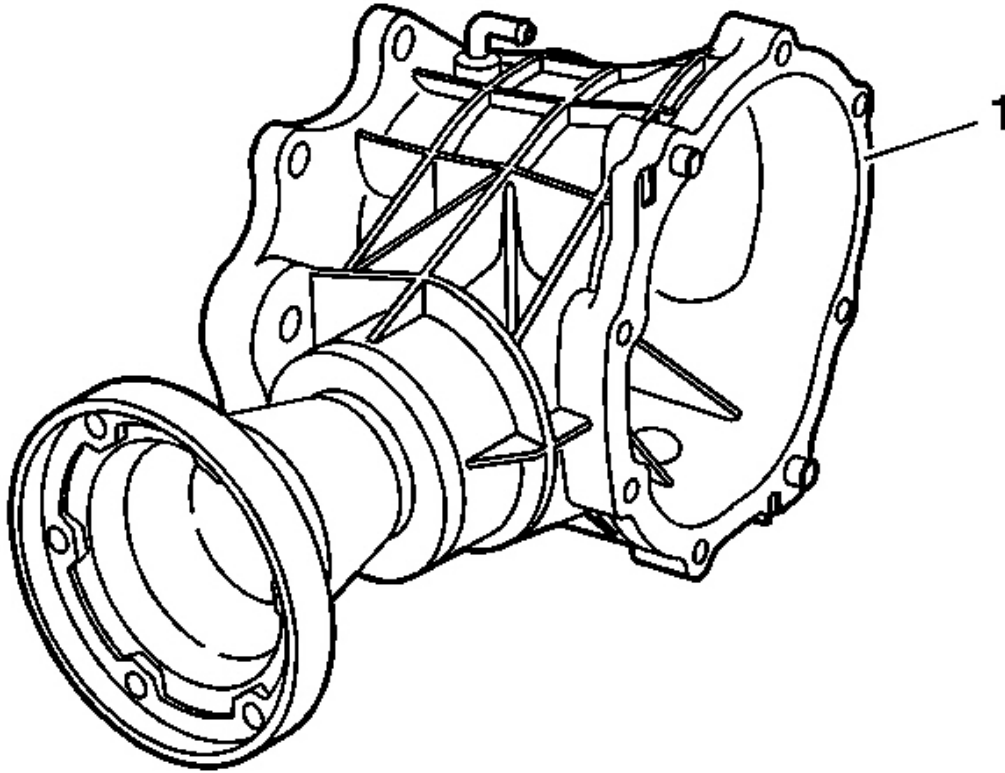


Fig. 39: Cleaning Carrier Assembly Housing Sealing Surface
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not use motor-powered tools to clean surfaces.

6. Clean the carrier assembly housing sealing surface (1) with solvent and scrape it clean with a razor blade.

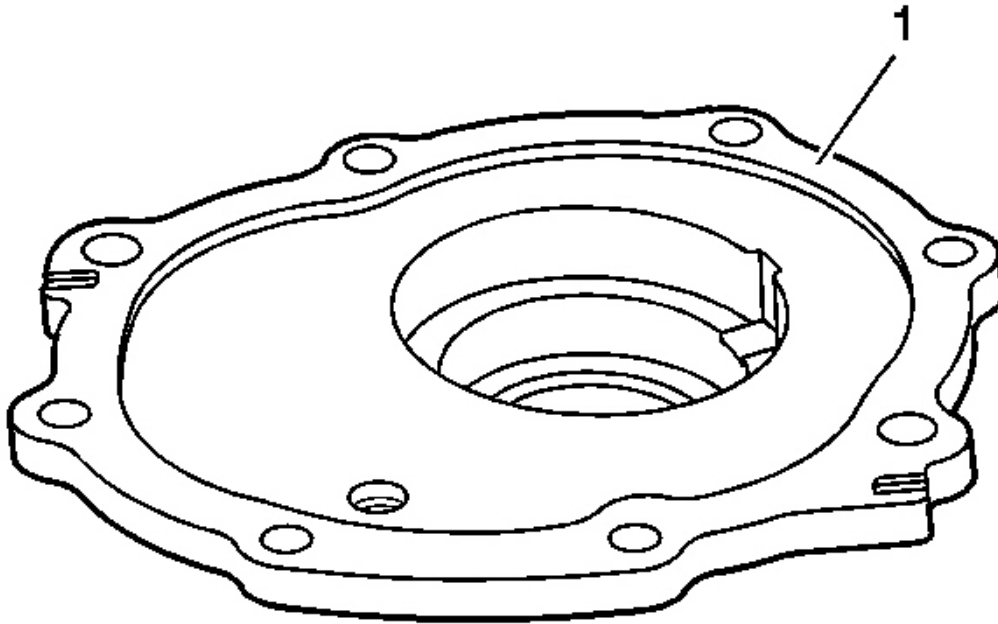


Fig. 40: Cleaning Cover Sealing Surface
Courtesy of GENERAL MOTORS CORP.

7. Clean the cover sealing surface (1) with solvent and scrape it clean with a razor blade.

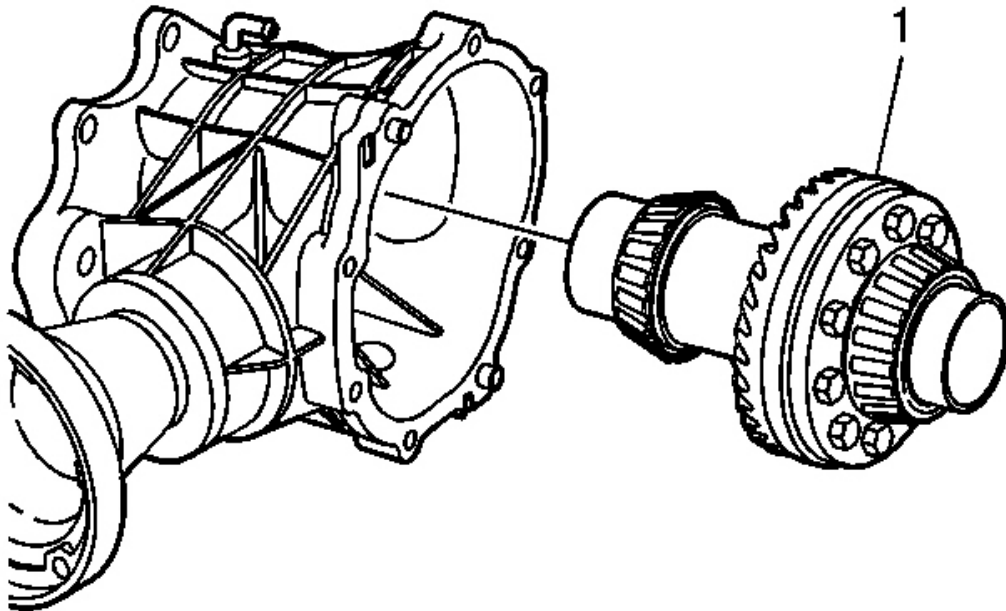


Fig. 41: Removing/Installing Carrier Assembly From The Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Grease the seal lips in order to protect the seal and to ease in assembly.

8. Install the carrier assembly (1) to the housing.

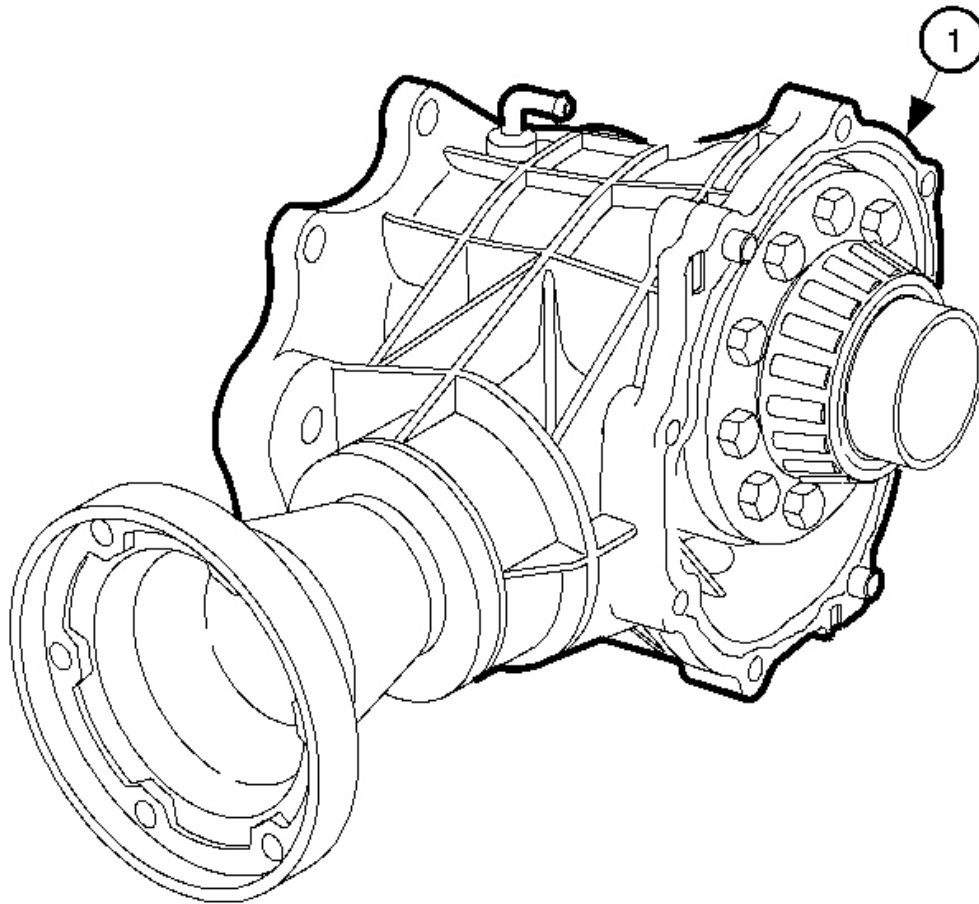


Fig. 42: Applying Sealer To Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not apply excess sealer. Excess sealer could cause premature failure.

9. Apply a 2-3 mm (0.8-0.12 in) amount of sealer Saturn P/N 1052943, or equivalent, to the housing (1).

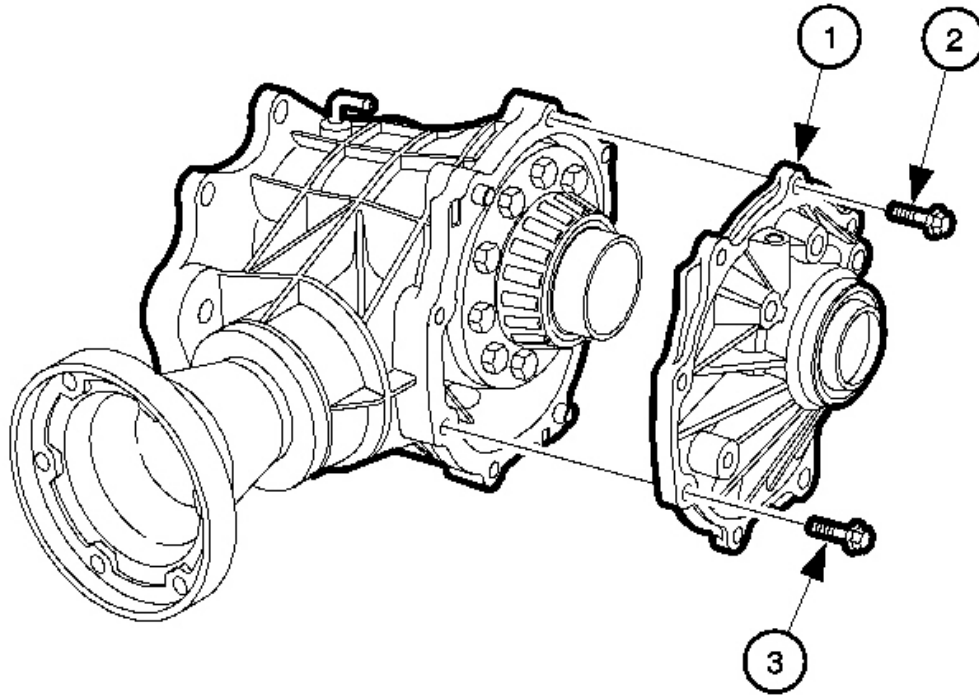


Fig. 43: Installing Side Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: Grease the seal lips in order to protect the seal and to ease in assembly.
Coat bolt threads with sealant Saturn P/N 12345382.

10. Install the side cover (1) and bolts (2 and 3) to the housing.

Tighten: Tighten the side cover bolts to 37 N.m (27 lb ft).

11. Install the drain plug. Apply sealant Saturn P/N 21485278 to the threads.

Tighten: Tighten the drain plug 24 N.m (18 lb ft).

12. Fill the transfer case with fluid, after it is installed in the vehicle, to the bottom of the fill plug hole, or 540 ml (18.2 oz).

13. Install the fill plug. Apply sealant Saturn P/N 21005994 to the threads.

Tighten: Tighten the fill plug 15 N.m (11 lb ft).

FRONT DRIVE AXLE INNER STUB SHAFT BEARING REPLACEMENT

Tools Required

- **J 29369-2** Bushing/Universal Remover. See **Special Tools and Equipment** .
- **J 4972-4** Output Shaft Needle Bearing Installer. See **Special Tools and Equipment** .

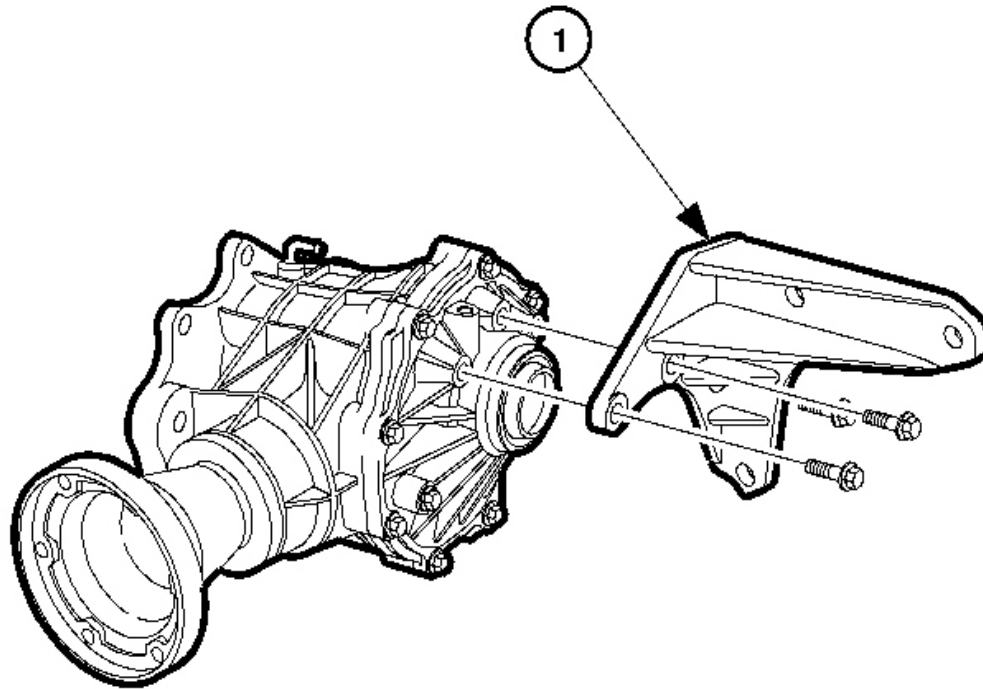


Fig. 44: Differential Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the 3 bolts from the bracket (1).
2. Remove the bracket (1).

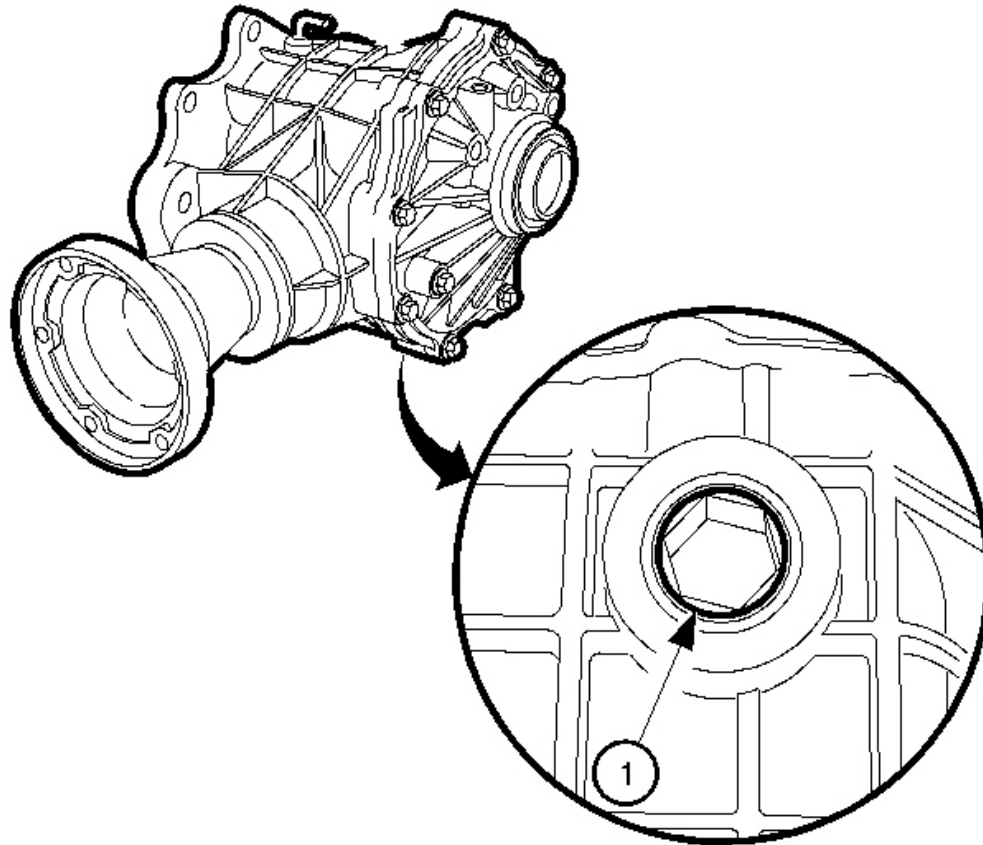


Fig. 45: Removing Drain Plug
Courtesy of GENERAL MOTORS CORP.

3. Remove the drain plug (1).

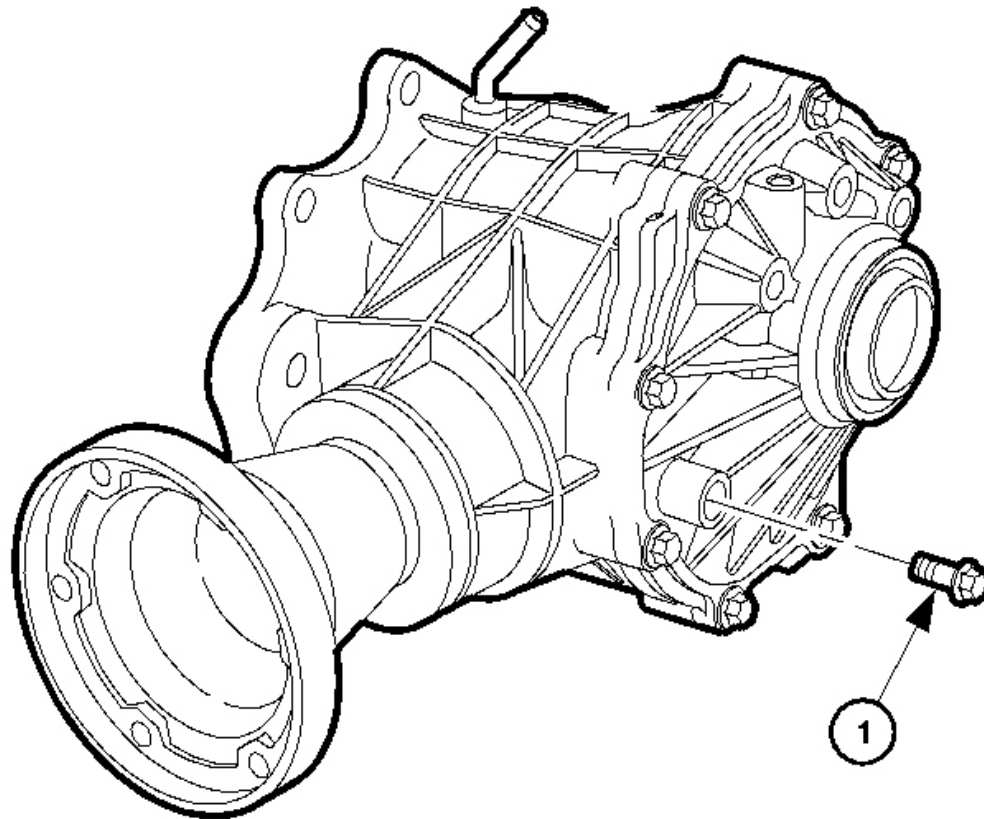


Fig. 46: Removing Fill Plug
Courtesy of GENERAL MOTORS CORP.

4. Remove the fill plug (1) and drain the fluid.

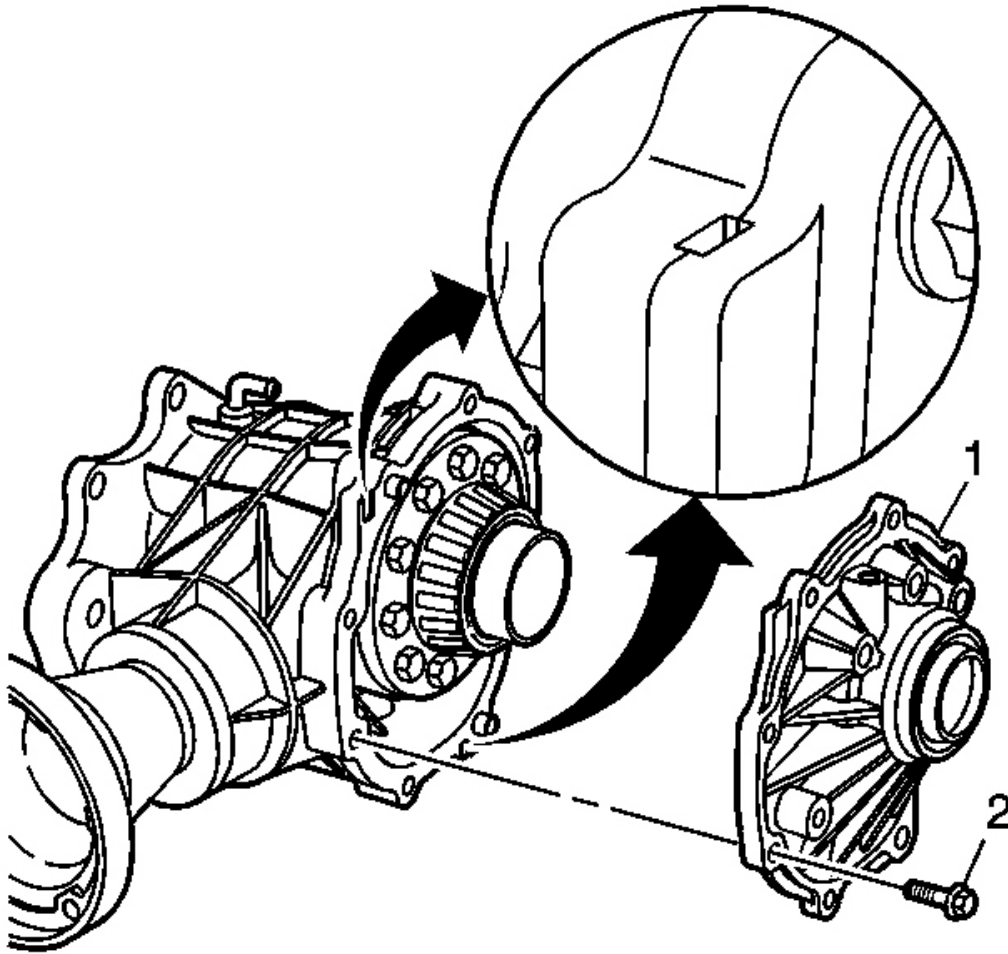


Fig. 47: Removing Bolts From The Side Cover
Courtesy of GENERAL MOTORS CORP.

5. Remove all bolts (2) from the side cover (1).
6. Use the pry point relief slots to remove the cover.

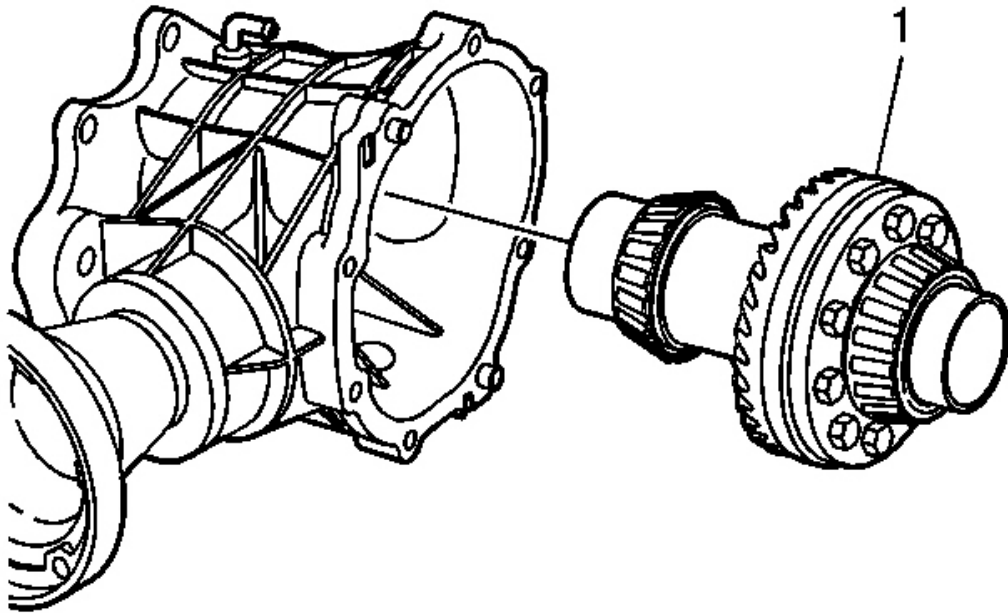


Fig. 48: Removing/Installing Carrier Assembly From The Housing
Courtesy of GENERAL MOTORS CORP.

7. Remove the carrier assembly (1) from the housing.

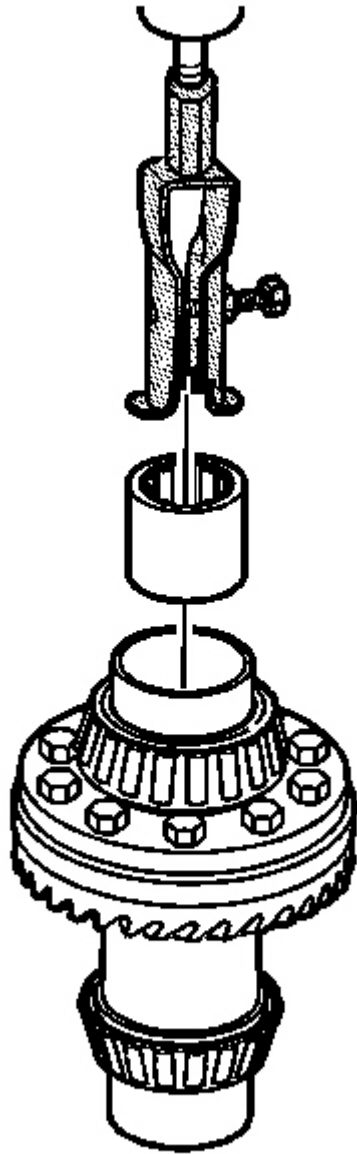


Fig. 49: Removing Stub Shaft Inner Bearing From Carrier Bore
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Perform this step only if the bearing needs to be replaced. Do not use the old bearing again.

8. Using **J 29369-2** and a slide hammer, remove the stub shaft inner bearing (1) from carrier bore. See **Special Tools and Equipment** . OTC 8007 adaptors may be needed to assist in the removal.

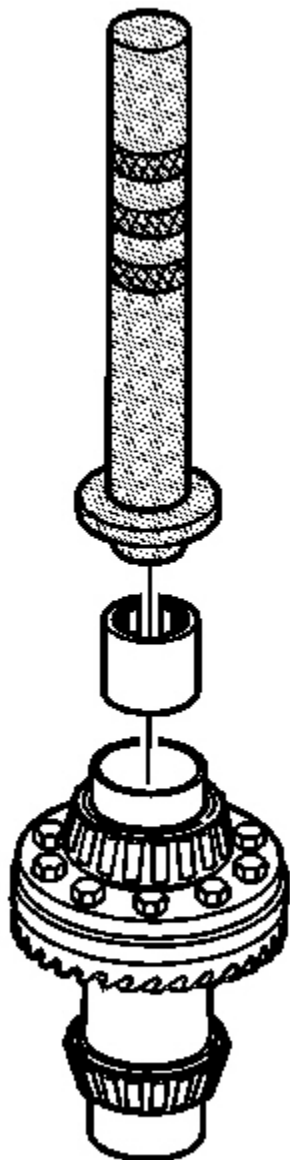


Fig. 50: Installing Axle Shaft Bearing On The Carrier
Courtesy of GENERAL MOTORS CORP.

- Using **J 4972-4** and a driver, install the axle shaft bearing (1) to the carrier until the bearing seats. See **Special Tools and Equipment** .

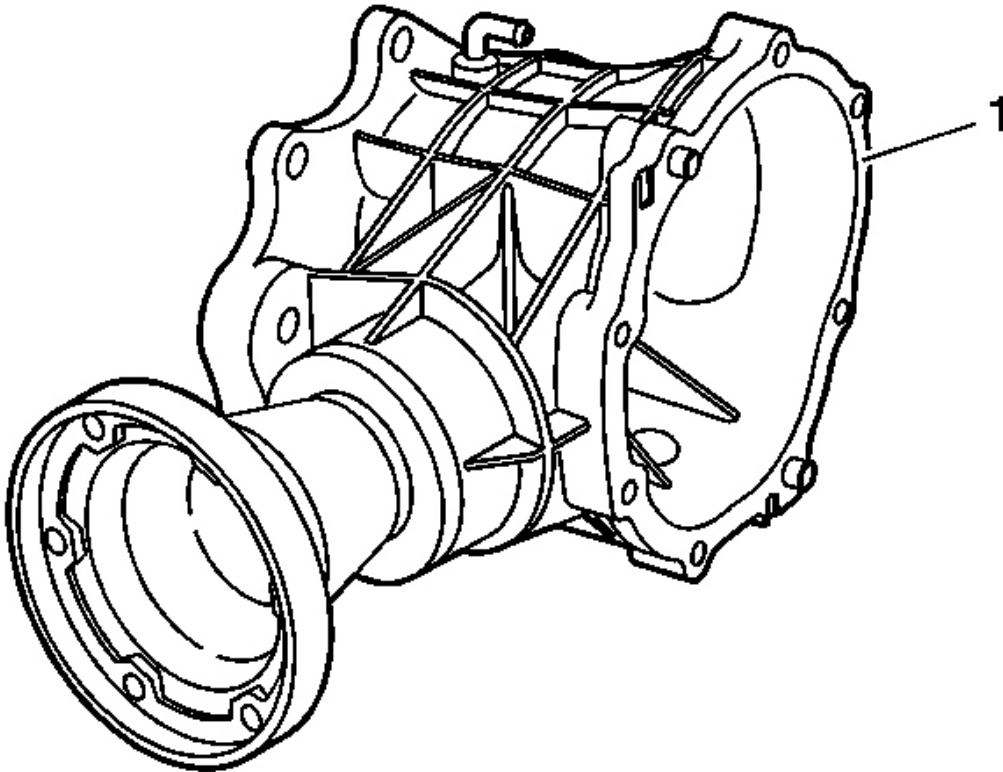


Fig. 51: Cleaning Carrier Assembly Housing Sealing Surface
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not use motor-powered tools to clean surfaces.

- Clean the carrier assembly housing sealing surface (1) with solvent and scrape it clean with a razor blade.

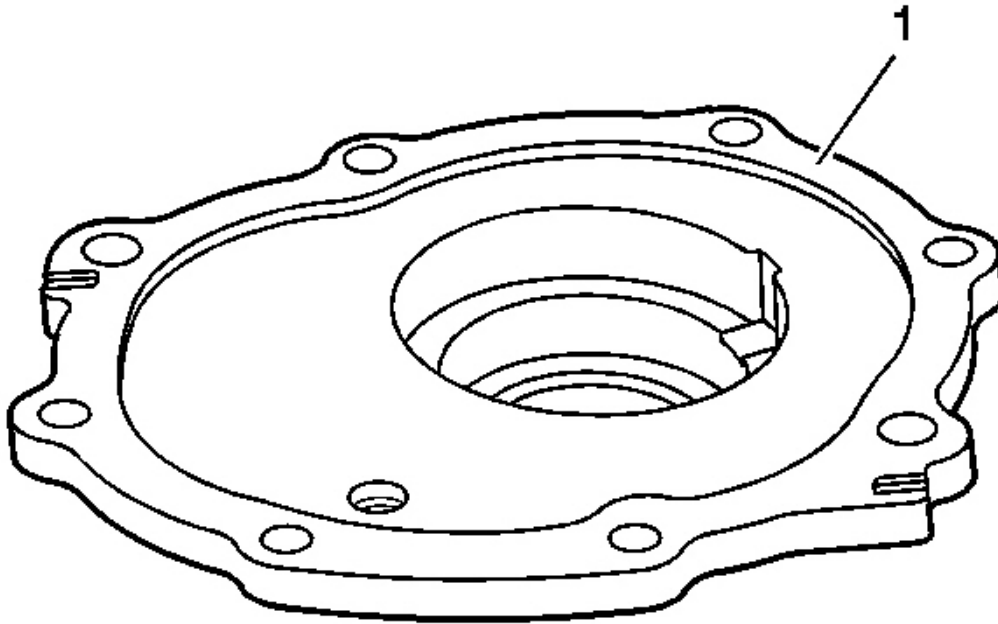


Fig. 52: Cleaning Cover Sealing Surface
Courtesy of GENERAL MOTORS CORP.

11. Clean the cover sealing surface (1) with solvent and scrape it clean with a razor blade.

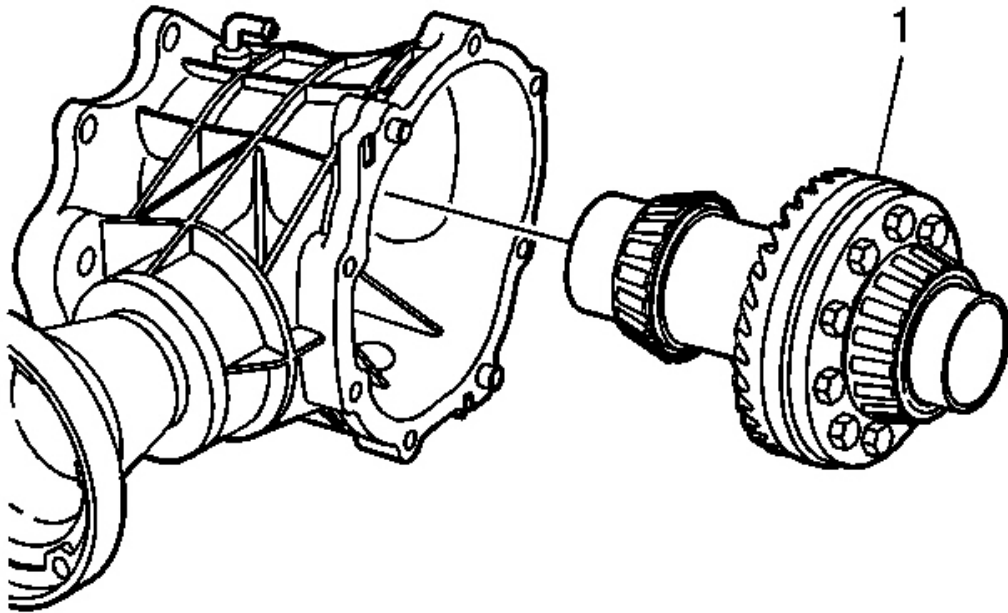


Fig. 53: Removing/Installing Carrier Assembly From The Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Grease the seal lips in order to protect the seal and to ease in assembly.

12. Install the carrier assembly (1) to the housing.

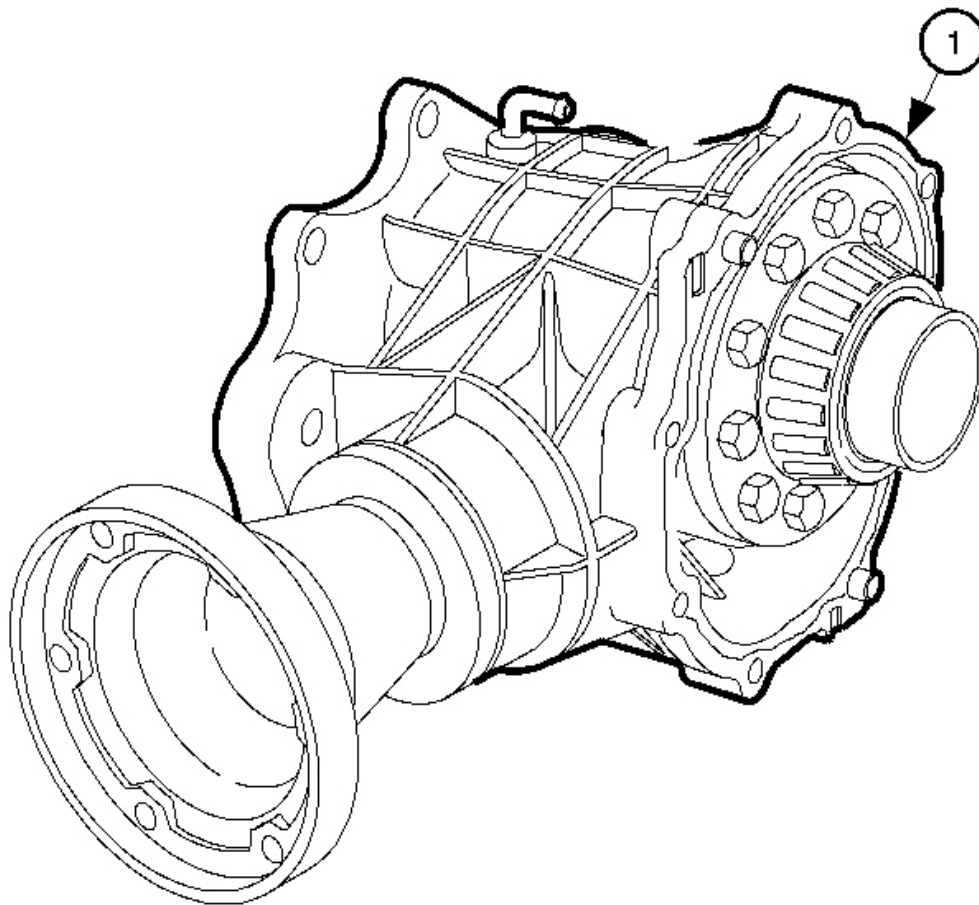


Fig. 54: Applying Sealer To Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not apply excess sealer. Excess sealer could cause premature failure.

13. Apply a 2-3 mm (0.8-0.12 in) amount of sealer Saturn P/N 1052943 or equivalent to the housing (1).

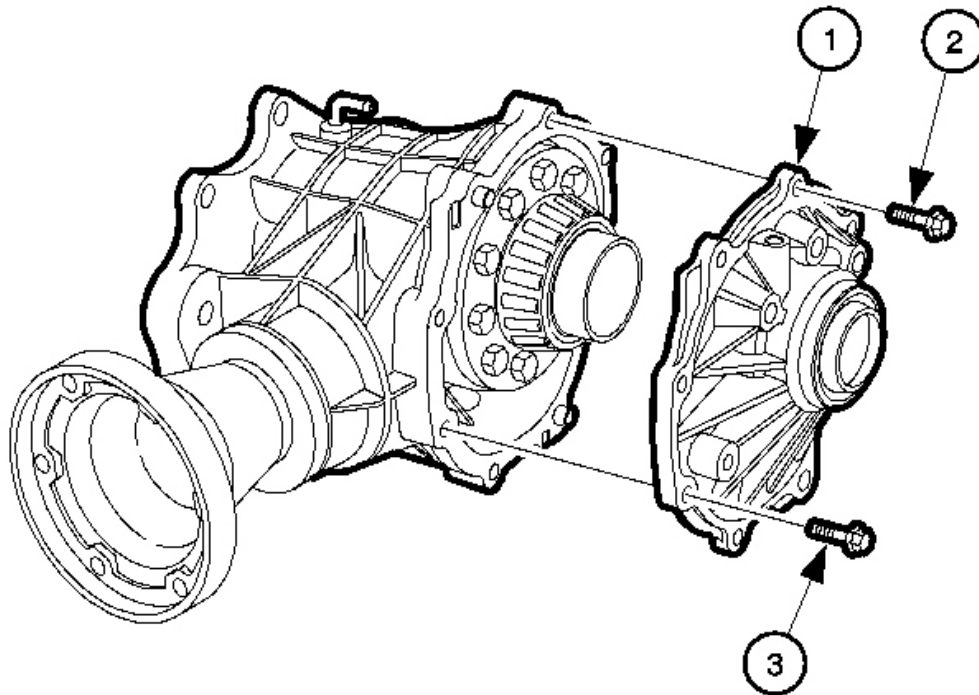


Fig. 55: Installing Side Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Grease the seal lips in order to protect the seal and to ease in assembly.
Coat the bolt threads with sealant Saturn P/N 12345382.

14. Install the side cover (1) and bolts (2 and 3) to the housing.

There is not a specific tightening sequence, but the bolts with dowel pins should be tightened first, and alternate the others from side to side.

Tighten: Tighten the side cover bolts to 37 N.m (27 lb ft).

15. Install the drain plug. Apply sealant Saturn P/N 21485278 to the threads.

Tighten: Tighten the drain plug 24 N.m (18 lb ft).

16. Fill the transfer case with fluid, after it is installed in the vehicle, to the bottom of the fill plug hole, or 540 ml (18.2 oz).

17. Install the fill plug. Apply sealant Saturn P/N 21005994 to the threads.

Tighten: Tighten the fill plug 15 N.m (11 lb ft).

TRANSFER CASE MOUNTING BRACKET REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the right hand axle. Refer to **Wheel Drive Shaft Replacement - Front** in Wheel Drive Shafts.

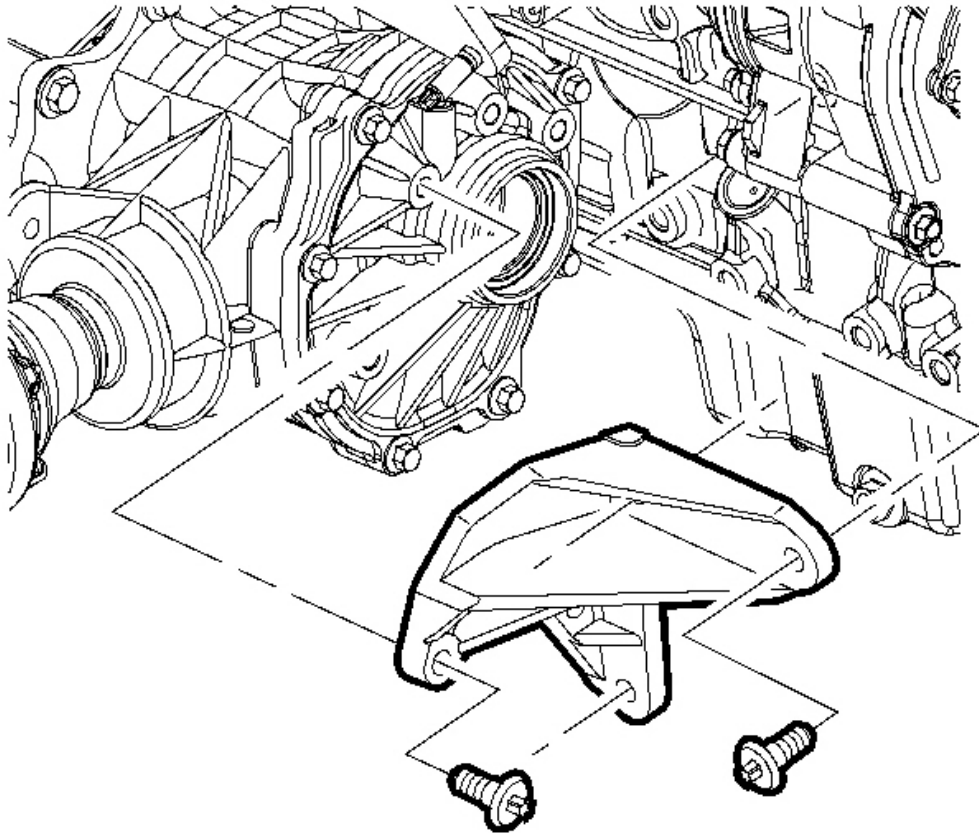


Fig. 56: View Of Transfer Case Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

3. Remove the bolts from the power take-off unit (PTU) brace and engine.
4. Remove the brace.

Installation Procedure

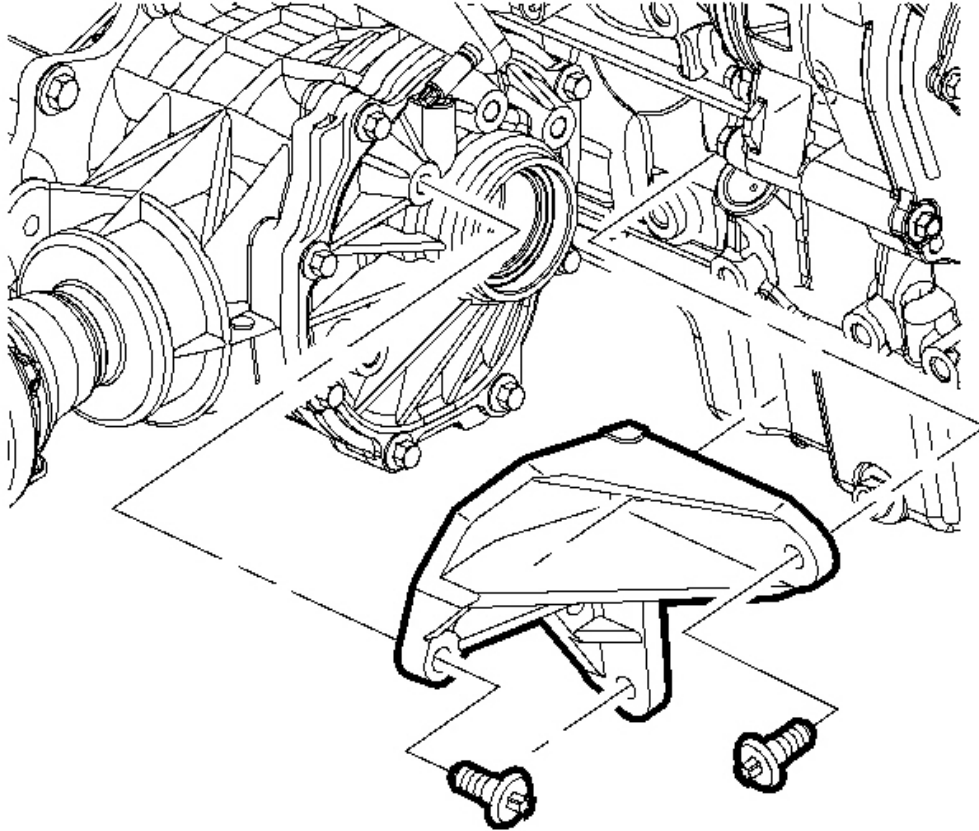


Fig. 57: View Of Transfer Case Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Position brace to the vehicle and hand start all bolts.

Tighten: Tighten the bolts to 60 N.m (44 lb ft).

2. Install the right hand axle. Refer to Wheel Drive Shaft Replacement - Front in Wheel Drive Shafts.

TRANSFER CASE REPLACEMENT

Tools Required

- J 44017 Shaft Remover
- SA9133T Slide Hammer

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the intermediate drive shaft. Refer to **Intermediate Shaft Replacement (L61)** or **Intermediate Shaft Replacement (L66)** in Wheel Drive Shafts.

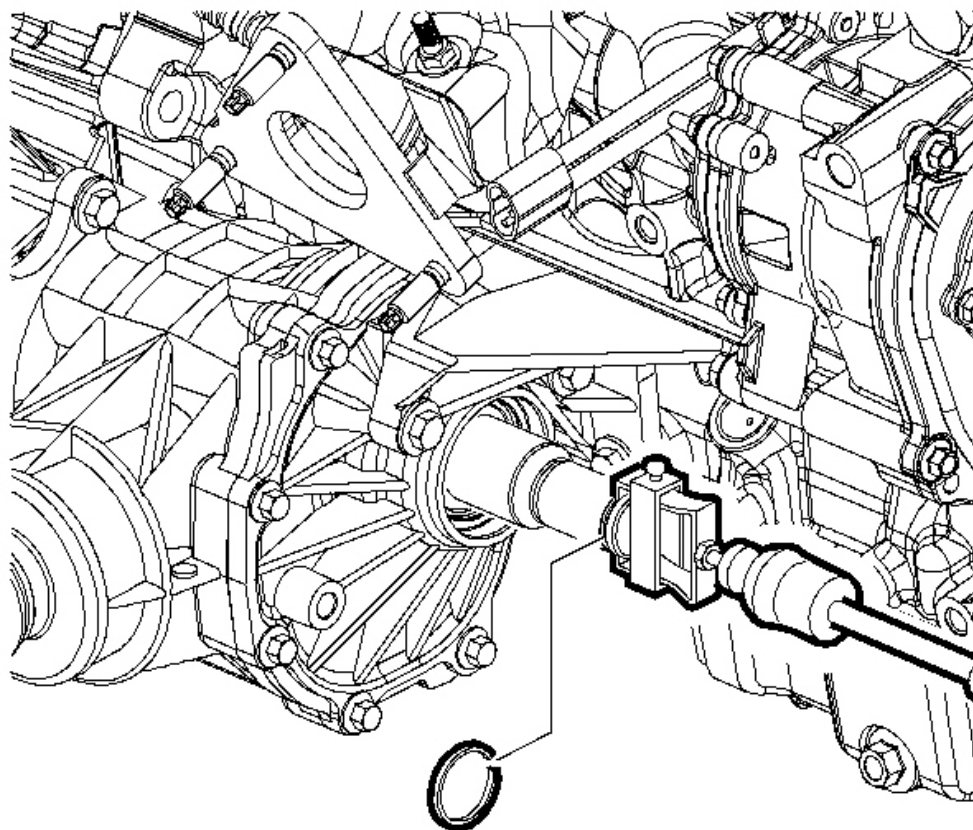


Fig. 58: Removing Retainer Ring From The Stub Shaft
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Remove the retainer ring from the stub shaft for tool installation. Discard the used retainer ring.

IMPORTANT: Use the proper container for fluid loss when the stub shaft is removed. Plug power take-off unit (PTU) to minimize fluid loss.

3. Disengage the PTU stub shaft from the PTU using the **J 44017** and **SA9133T** .

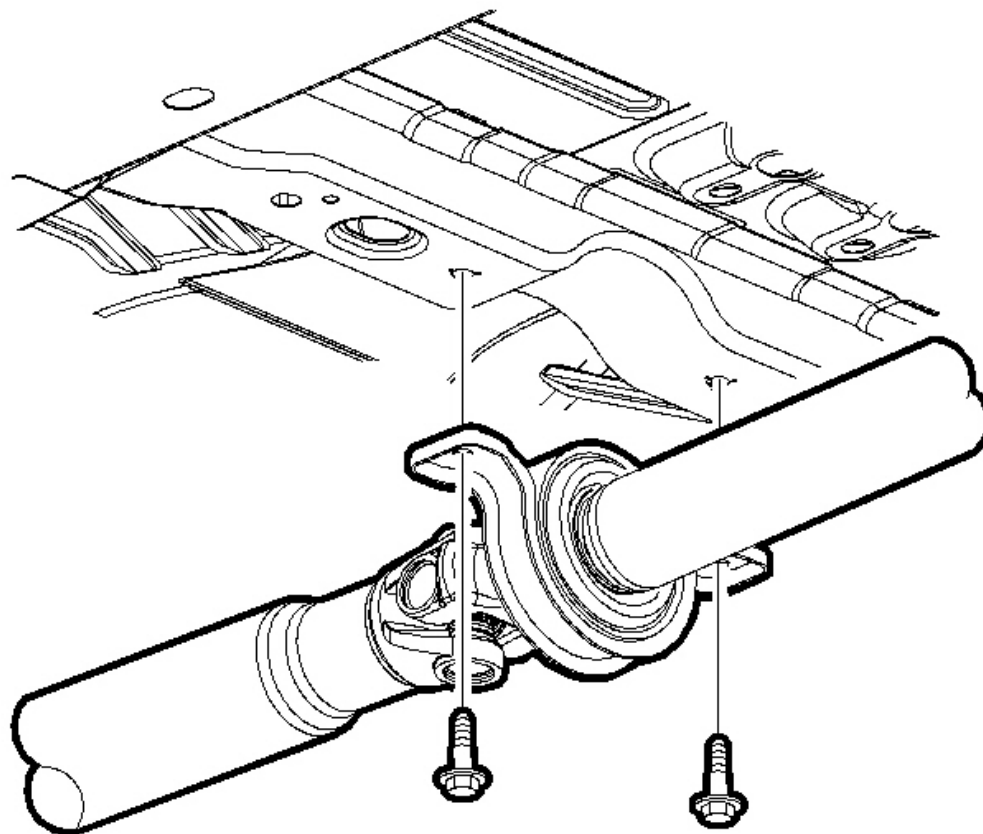


Fig. 59: Removing/Installing Intermediate Drive Shaft
Courtesy of GENERAL MOTORS CORP.

4. Remove the propshaft center bearing to underbody bolts.

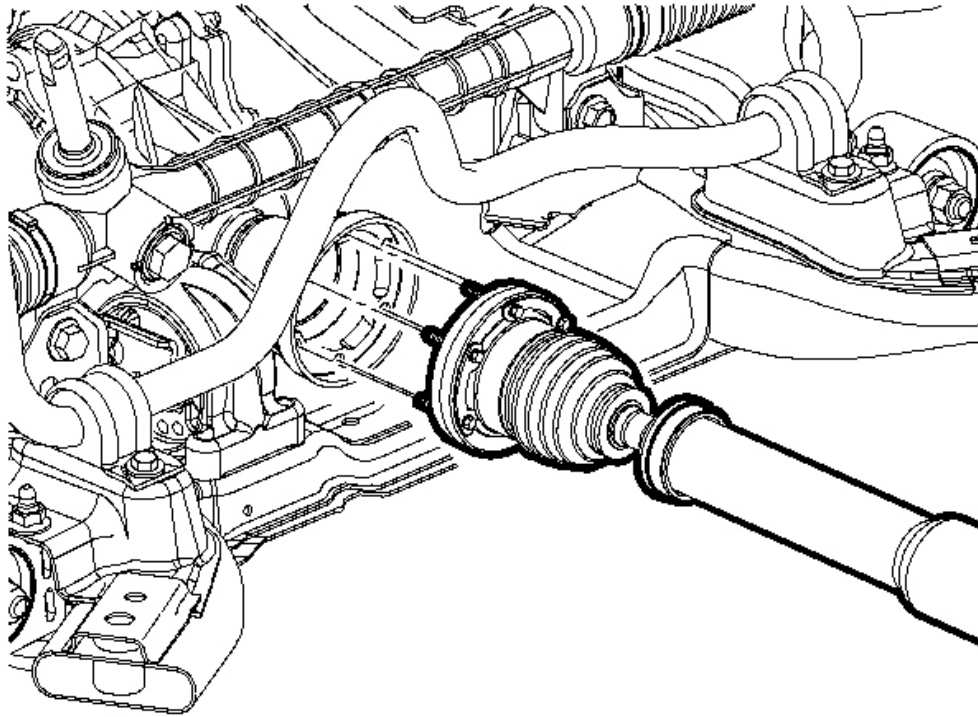


Fig. 60: Removing/Installing Front Propshaft
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Index mark the propshaft to PTU for re-installation.

5. Remove the front propshaft attachment bolts.
6. Compress the CV joint and disengage the propshaft from the PTU and secure with wire.

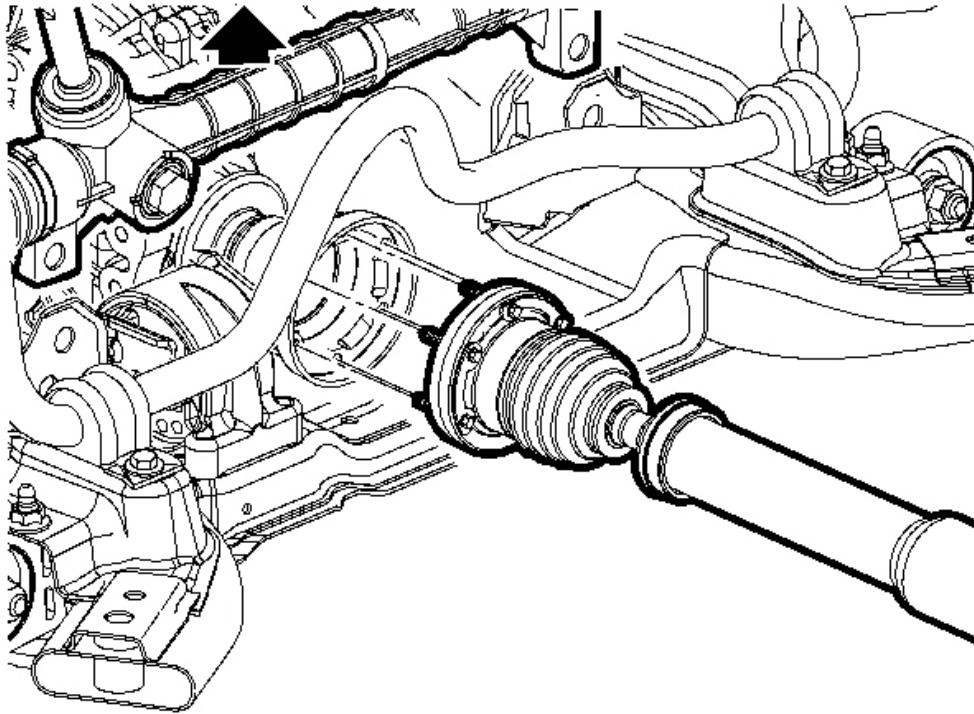


Fig. 61: Separating Steering Gear From The Cradle
Courtesy of GENERAL MOTORS CORP.

7. Separate the steering gear from the cradle for clearance. Refer to **Power Steering Gear Replacement** .

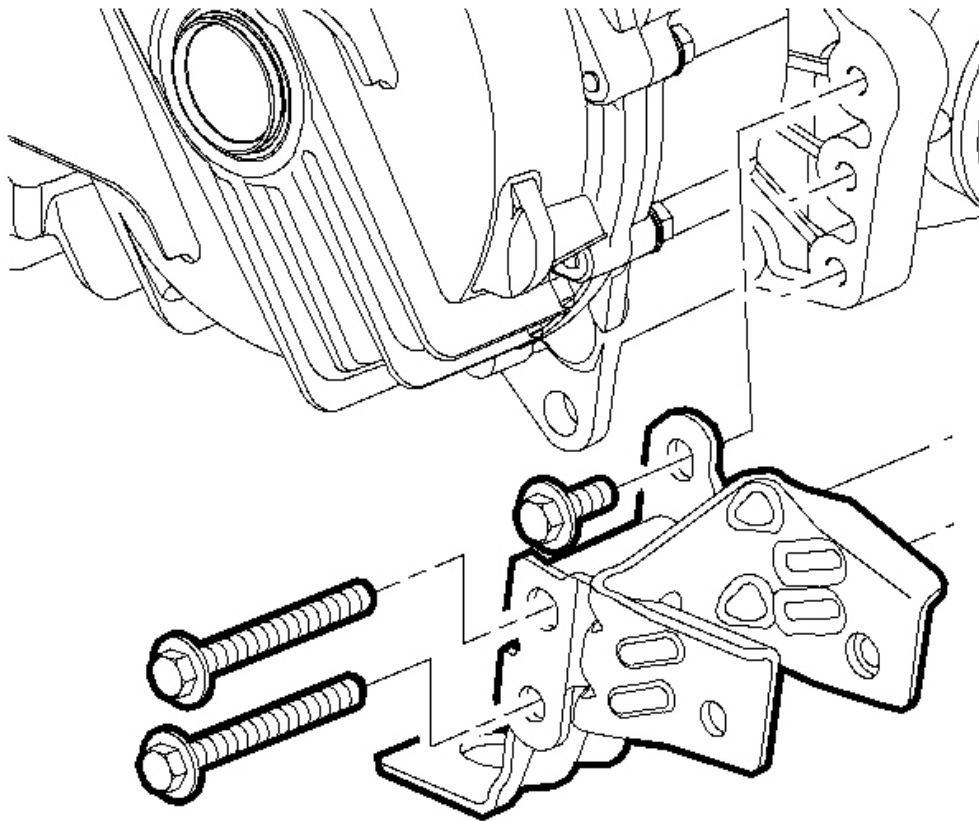


Fig. 62: Removing Rear Powertrain Mount Bracket Bolts From The PTU
Courtesy of GENERAL MOTORS CORP.

8. Remove the rear powertrain mount bracket bolts from the PTU.

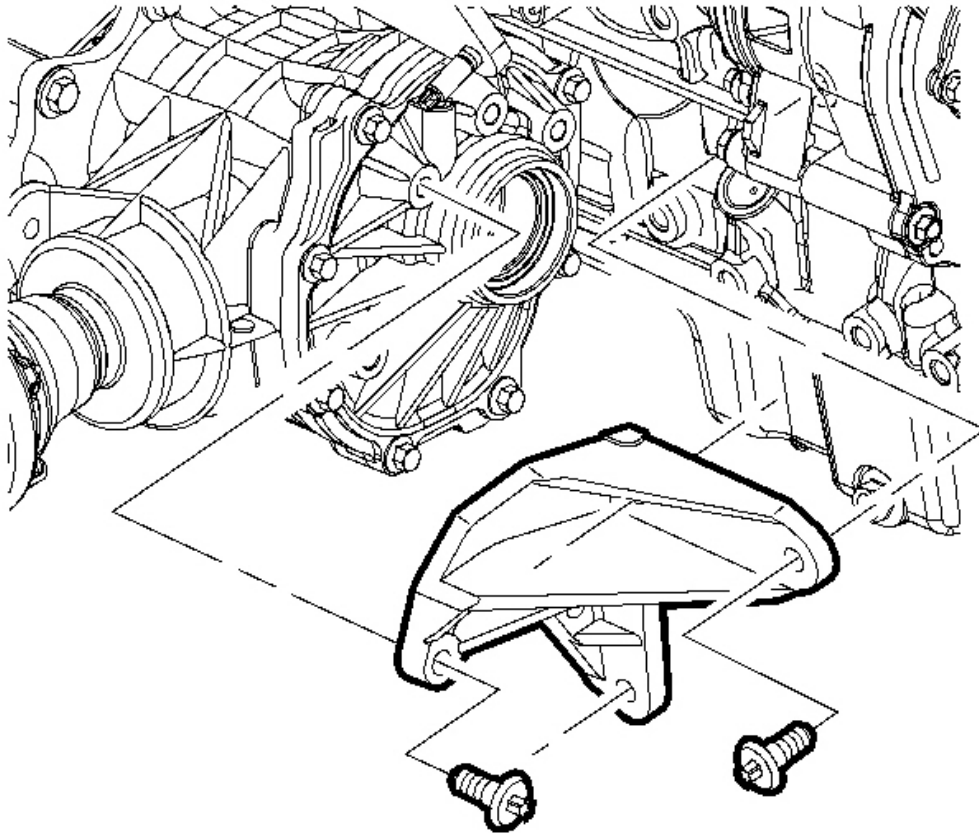


Fig. 63: View Of Transfer Case Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

9. Remove the PTU brace bolts and remove the brace.

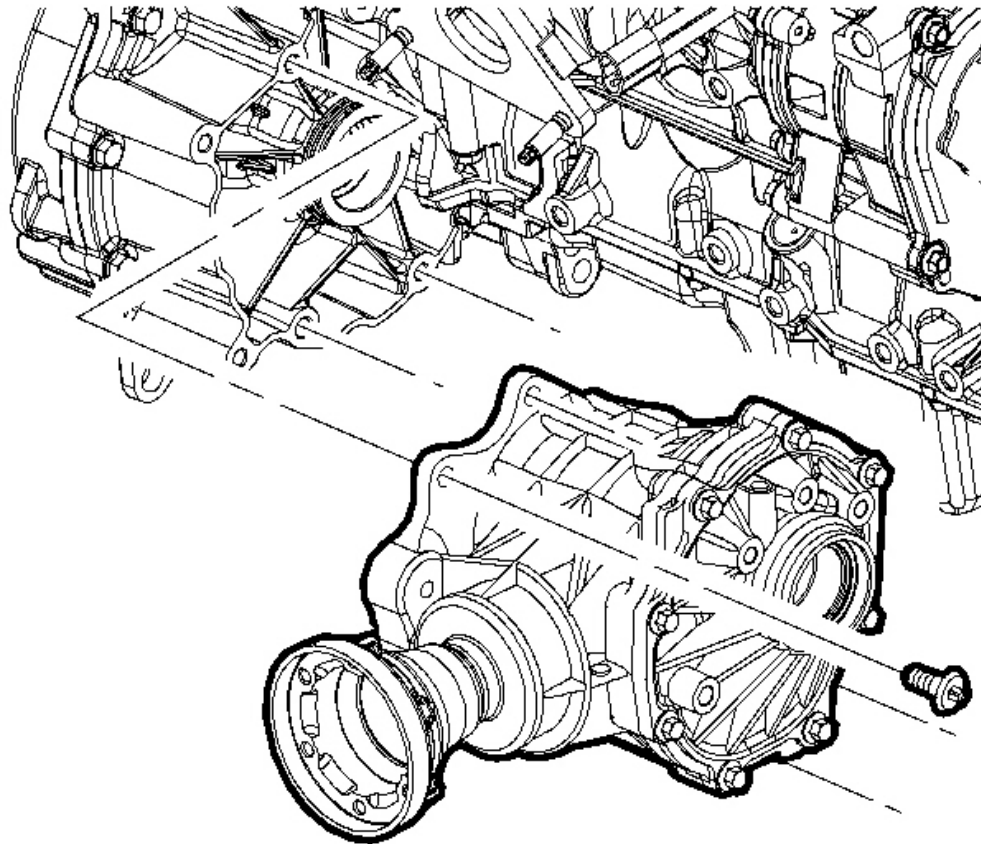


Fig. 64: Removing/Installing PTU To Transmission
Courtesy of GENERAL MOTORS CORP.

NOTE: To avoid oil loss when removing the PTU, position the assembly only in the upright (in-vehicle) position.

10. Remove the PTU to transmission bolts.
11. Remove the PTU vent hose.

Installation Procedure

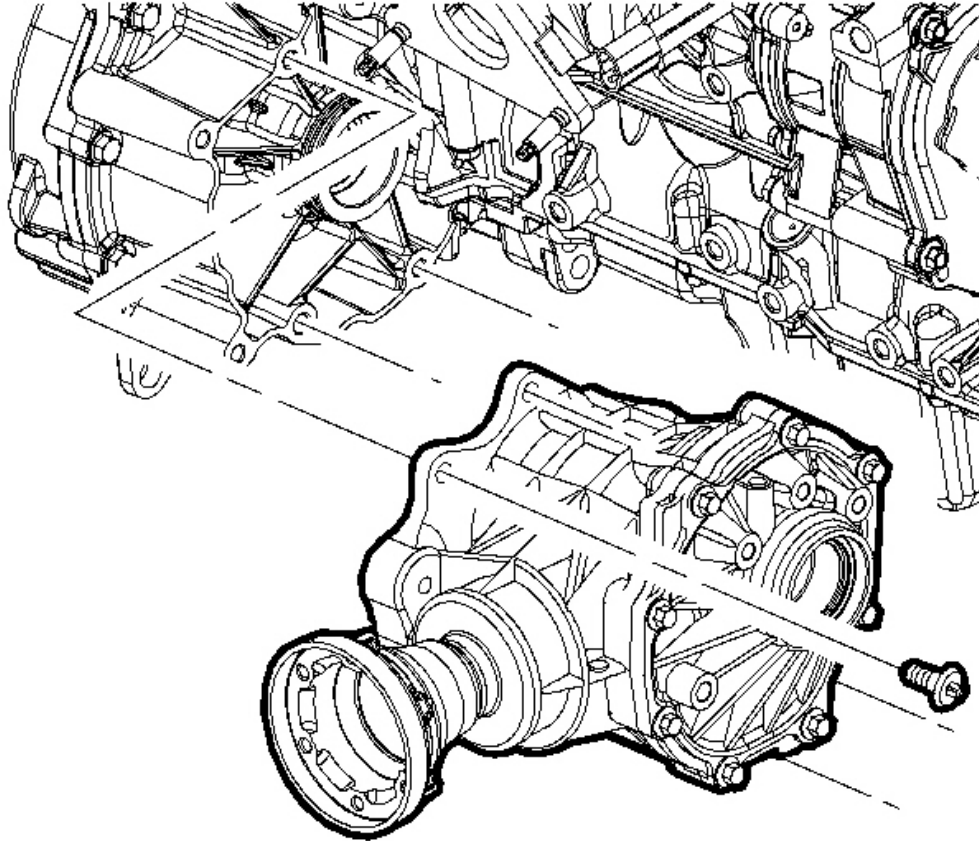


Fig. 65: Removing/Installing PTU To Transmission
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Lubricate the seal with transmission fluid prior to PTU installation.

1. Inspect the transmission output shaft seal, replace if damaged.
2. Install the PTU to transmission. Ensure the PTU is fully engaged. Hand start the PTU to transmission bolts. **DO NOT** tighten.

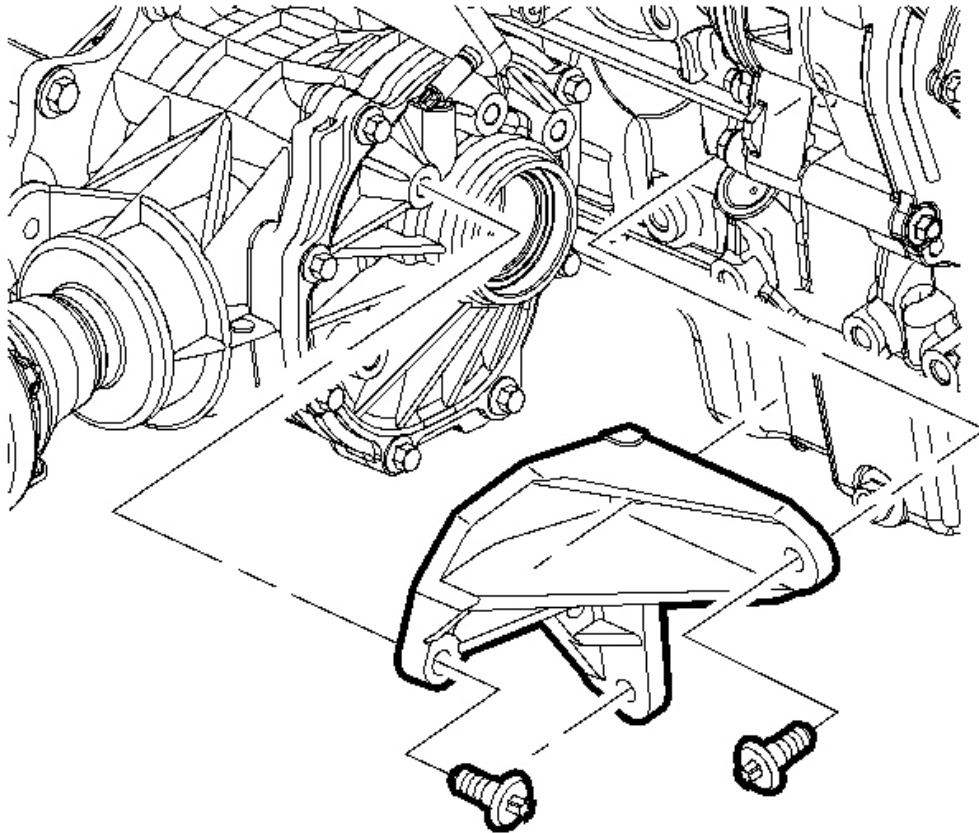


Fig. 66: View Of Transfer Case Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

3. Install the PTU brace. Hand start all 6 bolts.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Tighten the PTU to transmission bolts.

Tighten: Tighten the bolts to 60 N.m (44 lb ft).

5. Tighten the PTU brace bolts.

Tighten: Tighten the bolts to 60 N.m (44 lb ft).

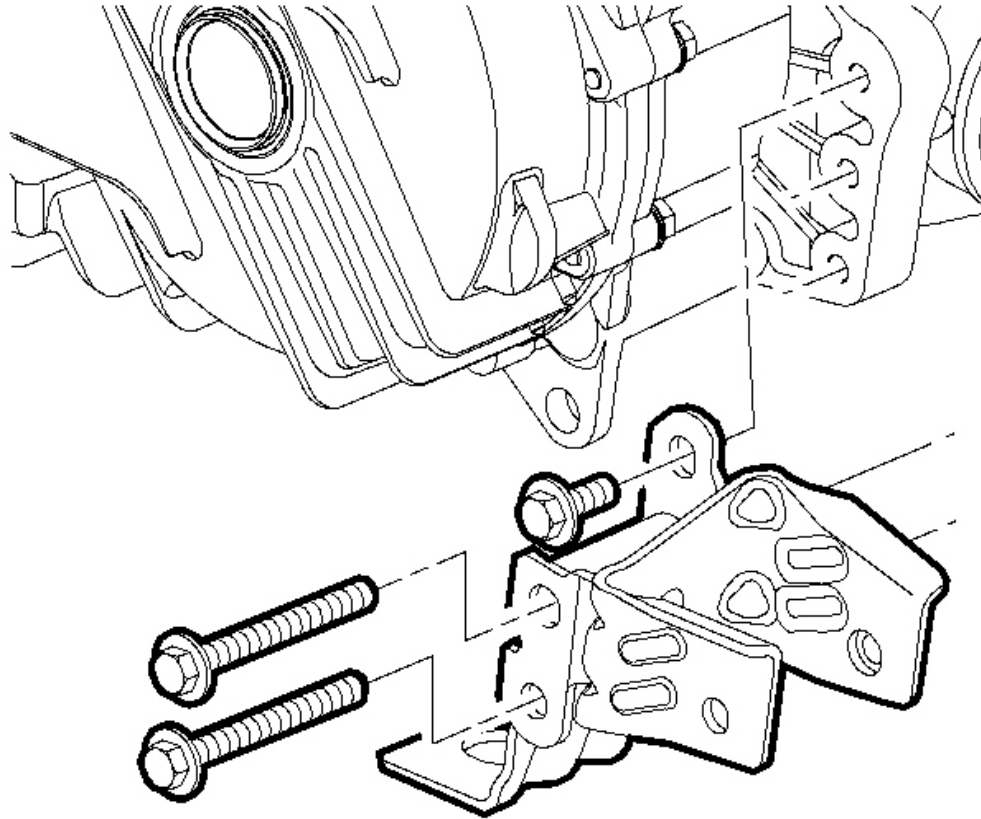


Fig. 67: Removing Rear Powertrain Mount Bracket Bolts From The PTU
Courtesy of GENERAL MOTORS CORP.

6. Hand start all the powertrain mount to PTU bolts and tighten.

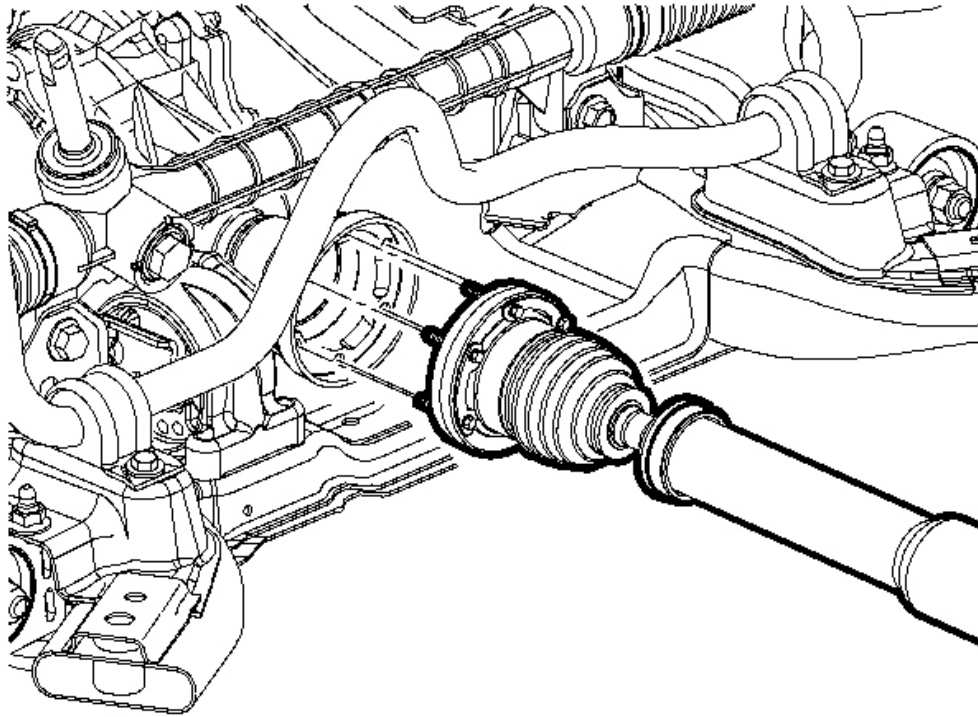


Fig. 68: Removing/Installing Front Propshaft
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Use the index mark for reassembly.

7. Hand start the propshaft center bearing bolts.
8. Ensure all the PTU flange and propshaft coupling area is clean. Insert coupling into the PTU flange.

IMPORTANT: Apply Permatex Threadlocker(R)-Blue to bolt threads.

9. Hand start all propshaft coupling bolts and tighten.

Tighten: Tighten the bolts to 25 N.m (19 lb ft).

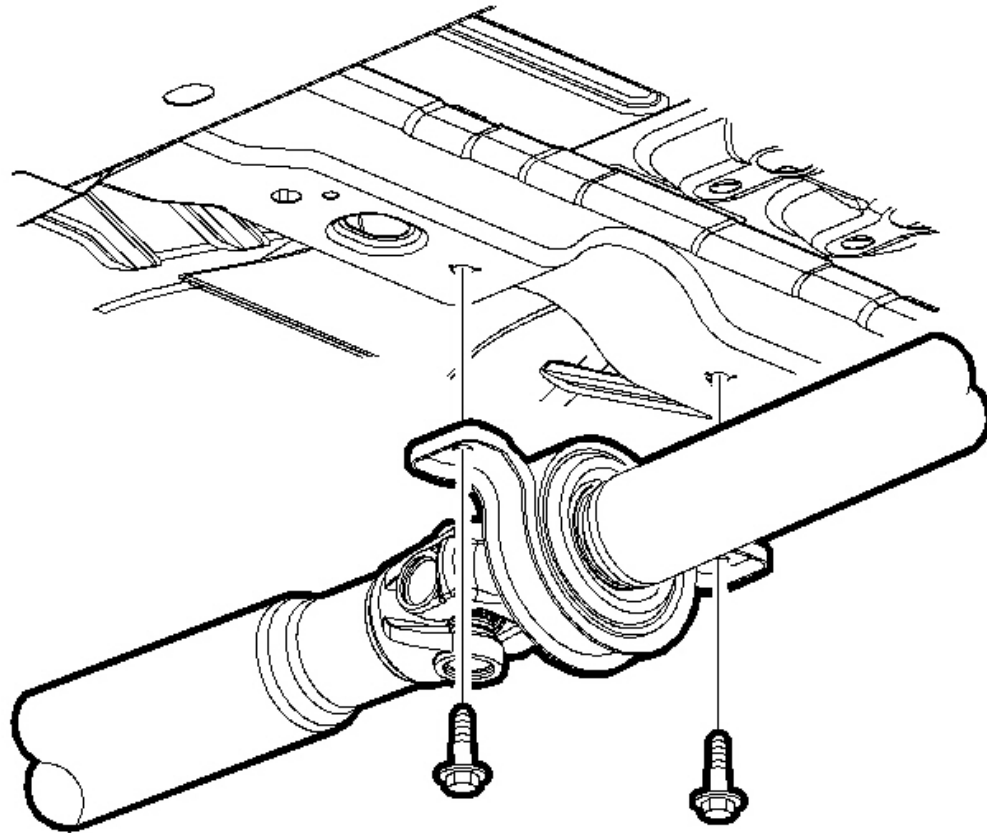


Fig. 69: Removing/Installing Intermediate Drive Shaft
Courtesy of GENERAL MOTORS CORP.

10. Install the center bearing bolts.

Tighten: Tighten the bolts to 25 N.m (19 lb ft).

11. Install the intermediate drive shaft. Refer to **Intermediate Shaft Replacement (L61)** or **Intermediate Shaft Replacement (L66)** in Wheel Drive Shafts.
12. Position the steering gear mounts to the cradle. Refer to **Power Steering Gear Replacement**.
13. Install the PTU vent hose.

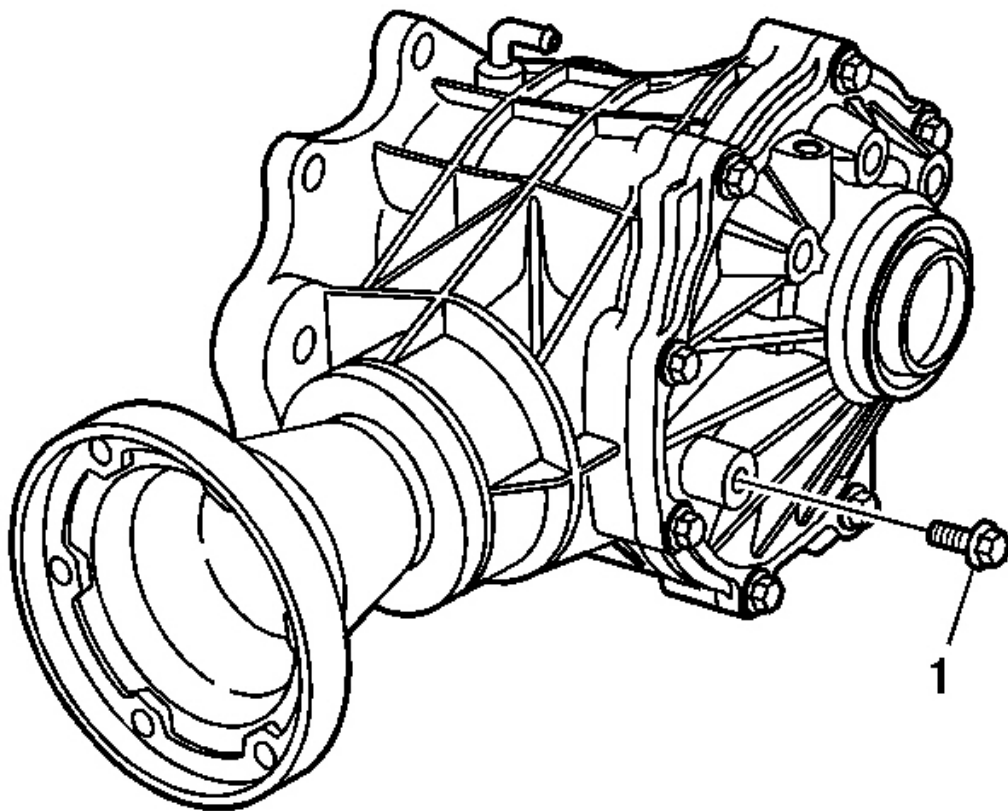


Fig. 70: Checking PTU Fluid Fill
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Use sealant GM P/N 12345493 or equivalent on fill plug.

14. Check the PTU fluid fill. Remove the fluid fill plug. Fill until fluid is just below the bottom of the fill hole.

Specification: Add 500 ml (17 oz) PTU fluid.

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

15. Lower the vehicle.
16. Start the engine and observe idle shape. Compare to pre-removal condition. If excessive, perform powertrain balance procedure-operation #1. Refer to Powertrain Balance procedure.
17. Check the transmission oil level and fill as required. Refer to **Transmission Fluid Replacement** in

TRANSFER CASE HOUSINGS CLEANING AND INSPECTION

Housings

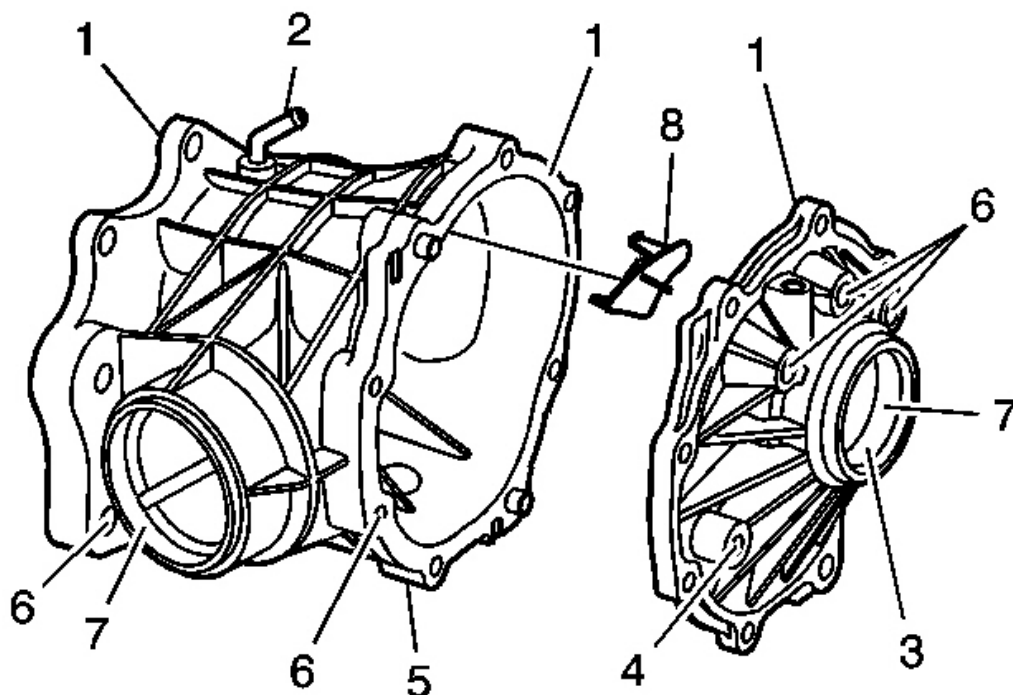


Fig. 71: View Of Case Housings
Courtesy of GENERAL MOTORS CORP.

1. Clean all case/housings in solvent.
2. Inspect for the following:
 - Damaged gasket sealing surfaces (1)
 - A loose, damaged, or restricted vent tube (2)
 - Worn, scored, or loose bearing races or worn bearing race bores (3)
 - Damaged drain plug (5)
 - Damaged fill plug hole threads (4)
 - Damaged bolt threads (6)
 - Damaged oil seal bores (7)

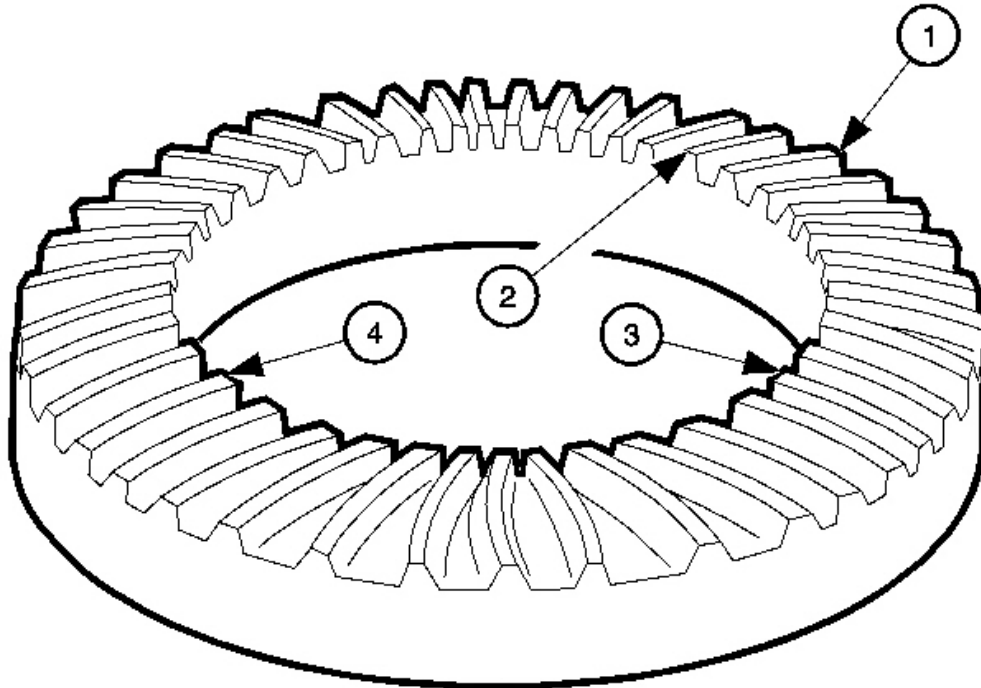


Fig. 72: Cleaning Gears & Shafts
Courtesy of GENERAL MOTORS CORP.

1. Clean the gears and shafts in solvent.
2. The ring gear and pinion must be inspected for proper wear and pattern.
 - The end of the gear tooth farthest away from center of ring gear (1) is the heel end of the tooth.
 - The end of the gear tooth nearest center of ring gear (2) is the toe end of the tooth.
 - The side of the tooth that curves inward or is concave (3) is considered the coast side of the tooth.
 - The side of the tooth that curves outward or is convex (4) is considered the drive side of the tooth.

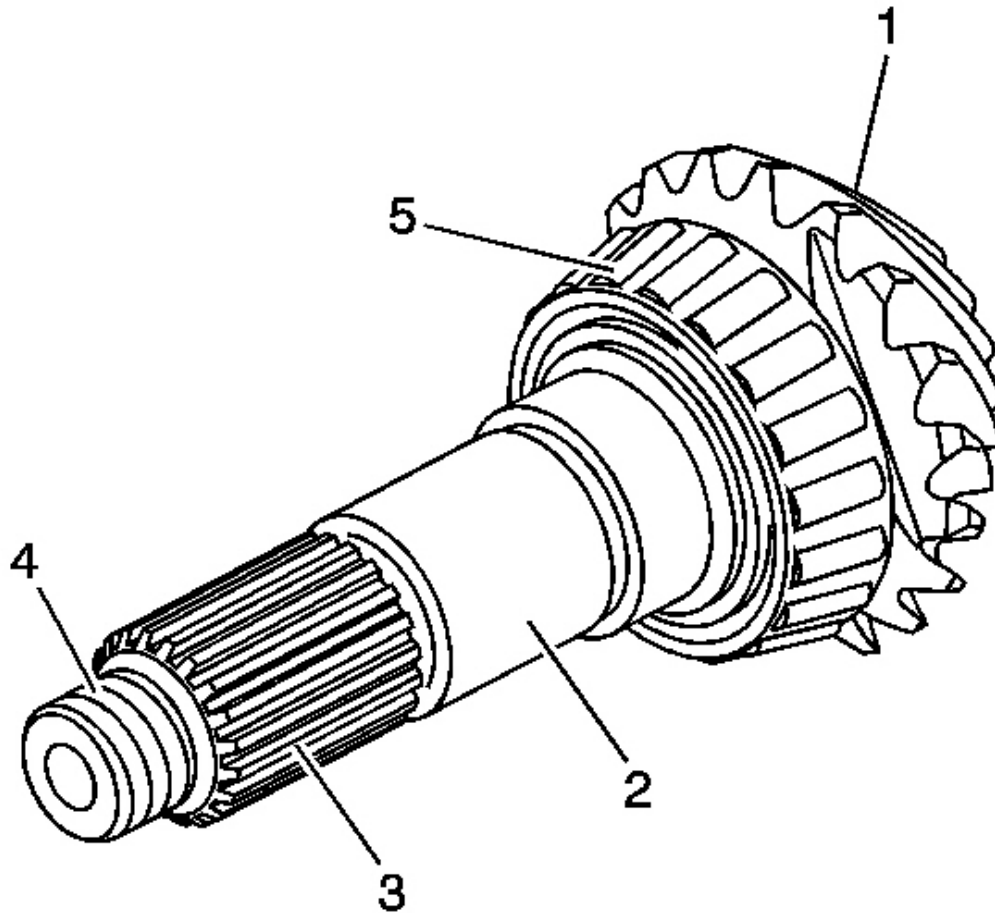


Fig. 73: Inspecting Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

3. Inspect the pinion shaft for the following:
 - Wear, pitting, or discoloration by heat on the gear teeth (1)
 - Worn or scored shaft (2)
 - Worn or damaged splines (3)
 - Damaged threads (4)
 - Worn bearings (5)

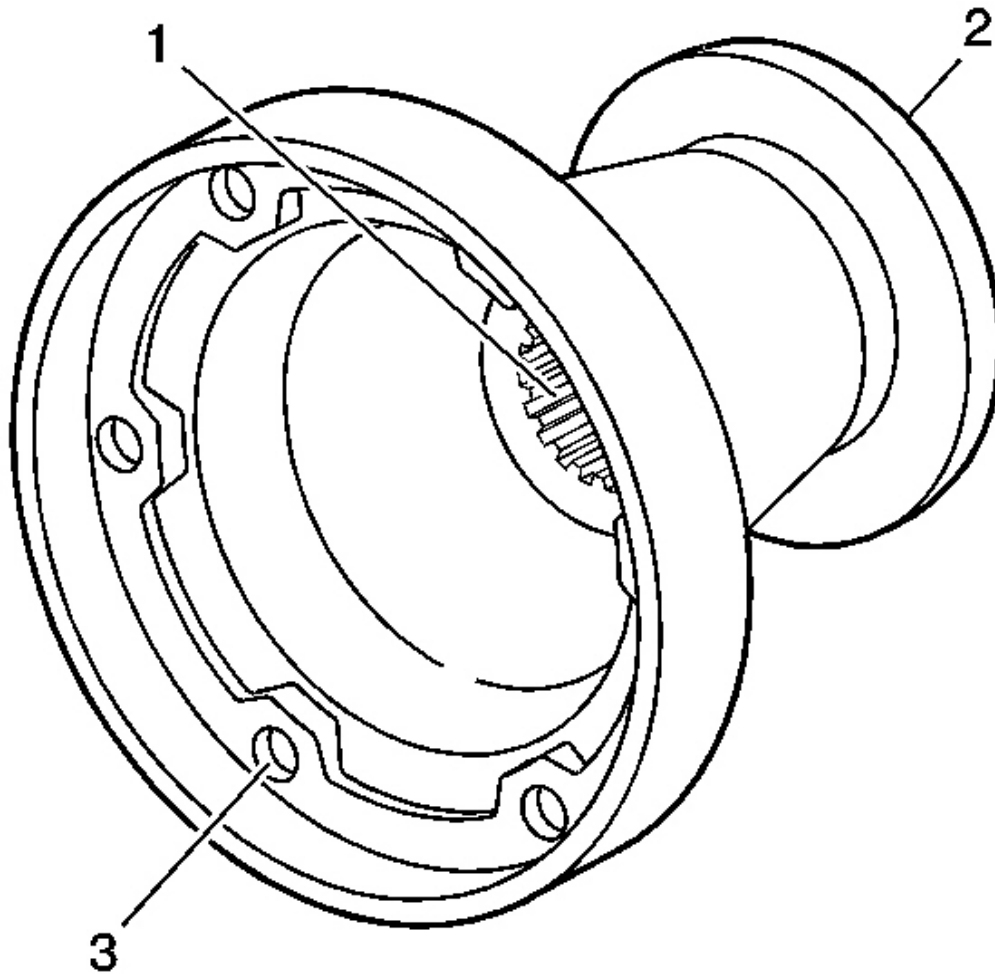


Fig. 74: Inspecting Pinion Flange For Wear, Damage Bolt Threads & Worn or Damaged Splines
Courtesy of GENERAL MOTORS CORP.

4. Inspect the pinion flange seating surface (2) for wear, damaged bolt threads (3) and worn or damaged splines (1).

Bearings and Races

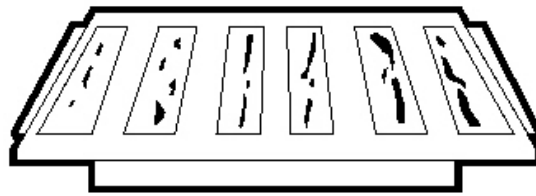
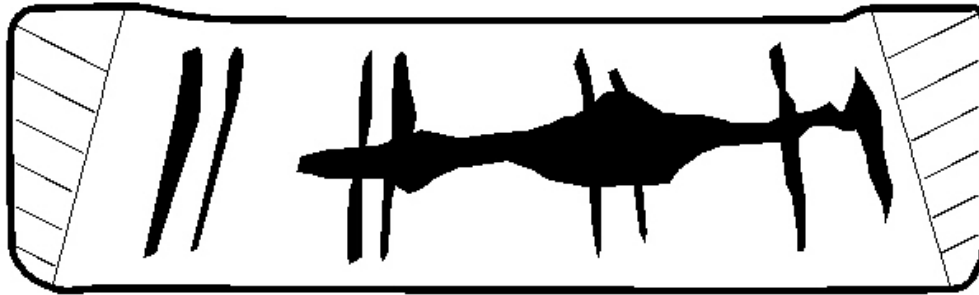


Fig. 75: Inspecting Bearing Rollers & Races
Courtesy of GENERAL MOTORS CORP.

1. Inspect the bearing rollers and races for the following:
 - Pitting
 - Scoring or grooves
 - Excessive wear or other damage

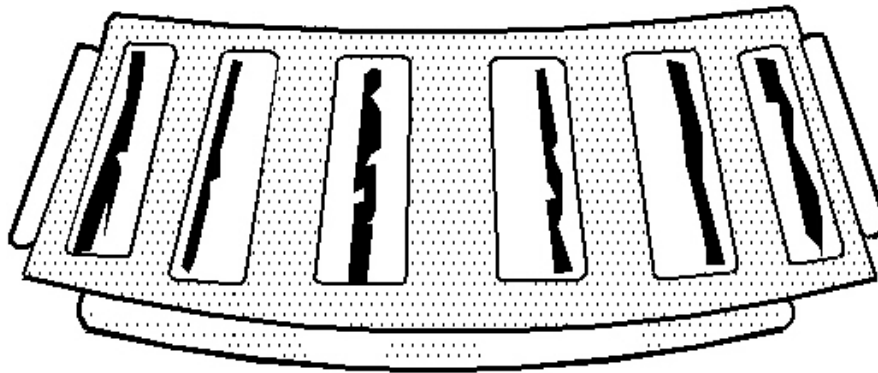
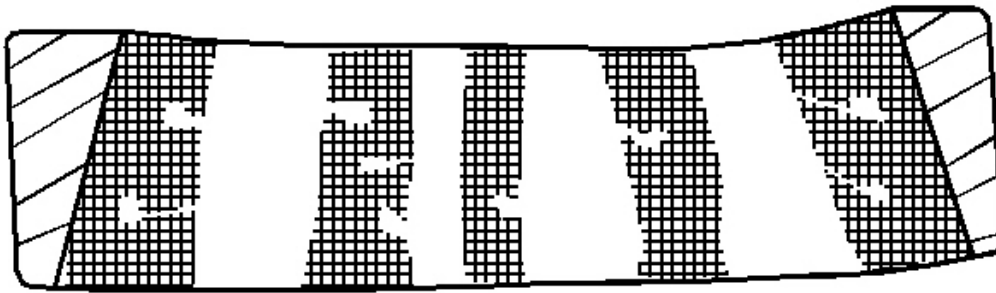


Fig. 76: Damaged Areas
Courtesy of GENERAL MOTORS CORP.

2. Inspect bearing rollers and races for heat discoloration. Heat discoloration ranges from a faint yellow to a dark blue color. This discoloration may result from an overload or improper lubrication. Excessive heat causes softening of the rollers and races. Bearing races with a sign of heat discoloration must be replaced.

DESCRIPTION AND OPERATION

TRANSFER CASE DESCRIPTION AND OPERATION

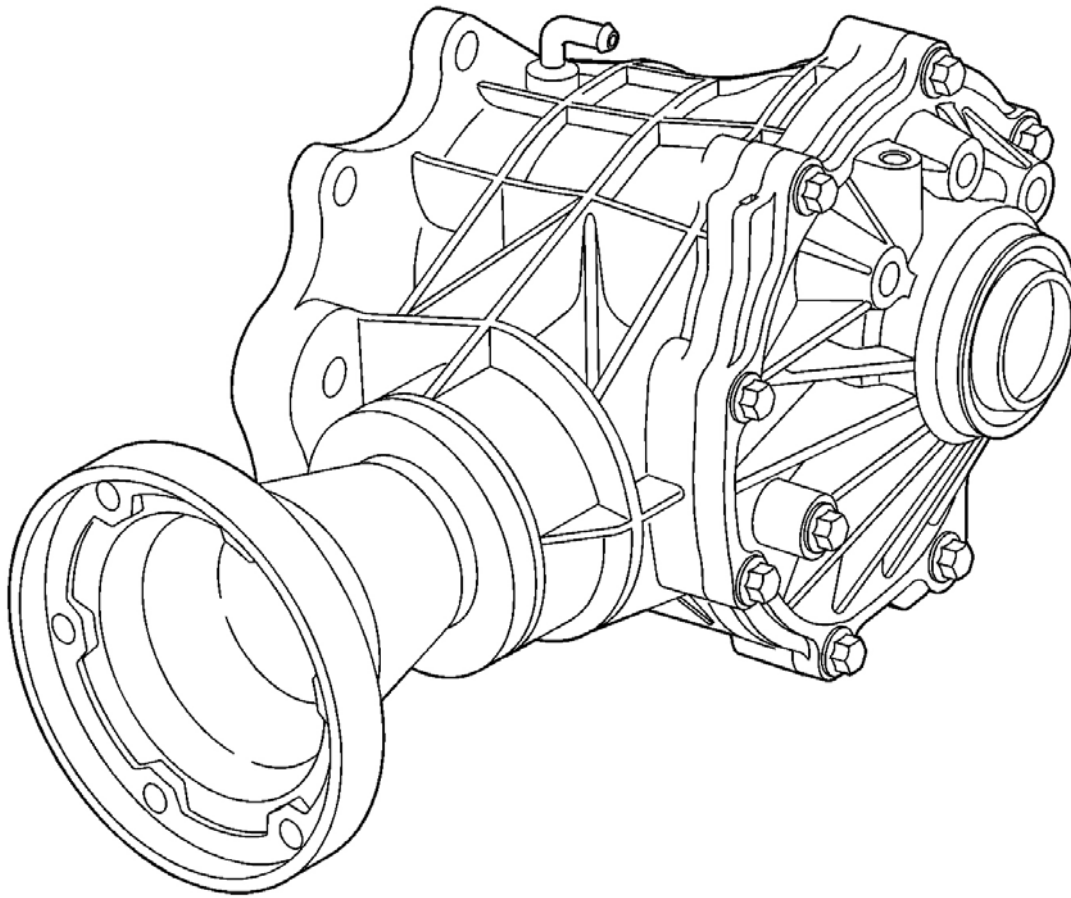


Fig. 77: View Of Transfer Case
Courtesy of GENERAL MOTORS CORP.

The transfer case (PTU) in this vehicle consists of an aluminum housing and a ring and pinion power transfer system.

The PTU transfers torque/power to the rear differential, gerotor pump design, via a two-piece propshaft assembly.

The on-demand rear differential distributes variable torque/power to the rear wheels via individual axle shafts.

The on-demand system operates as follows: only when front wheel slippage is encountered torque/power is proportioned to the rear wheels, as long as there is not front-to-rear speed difference; there is no torque/power to the rear wheels.

When front-to-rear wheel slippage does not occur, the rear differential, gerotor, pumps fluid stored in the sump to a piston that actuates a clutch pack, which then distributes torque/power to the rear wheels.

Power Take-Off Unit (PTU) Fluid

IMPORTANT: Use only GM Versatrak fluid.

The PTU uses a specifically developed synthetic hypoid gear lubricant, which is intended for lifetime service. Full fluid level is at the bottom of the fill plug hole.

Power Take-Off Unit (PTU) Operation

Motion is transferred from the engine crankshaft/flywheel through the transaxle. A ring and pinion design transfer case is mated to the right side of the transaxle.

The transfer case transfers torque/power to the rear differential via a two-piece propeller shaft assembly. The transfer case consists of an aluminum housing, a clutch pack/hydraulic pump assembly and a ring and pinion assembly.

The on-demand rear differential distributes variable torque/power to the rear wheels via individual axle shaft assemblies. The rear differential consists of an aluminum housing, a clutch pack/hydraulic pump assembly and a ring and pinion assembly.

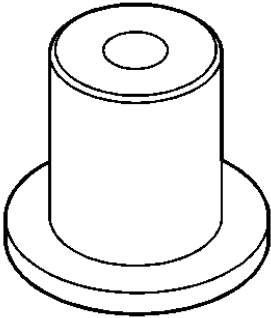
The system operates as follows:

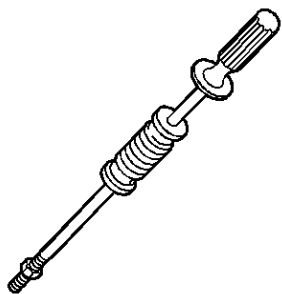
On-demand drive is provided to the rear wheels only when slippage is detected at the front wheels, there is no front-to-rear speed difference and no rear wheel drive torque. In the event there is front-to-rear wheel speed difference/slippage, a rotation speed difference between the gerotor pump components, rotor and housing, occurs. In those instances, the rotor draws fluid from the sump and through the internal passages of the differential carrier, sending pressurized fluid to a piston, actuating the rear clutch pack.

SPECIAL TOOLS AND EQUIPMENT

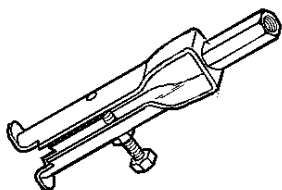
SPECIAL TOOLS

Special Tools

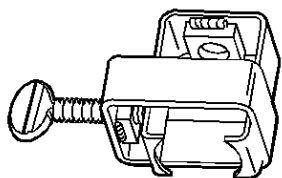
Illustration	Tool Number/Description
	J 4972-4 Output Shaft Needle Bearing Installer



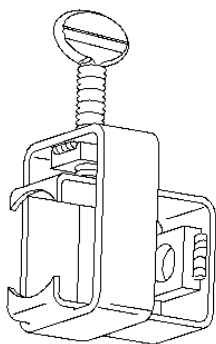
J 6125-1B
Slide Hammer with Adapter



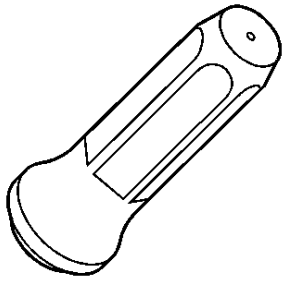
J 29369-2
Bushing and Bearing Remover - 2-3 in



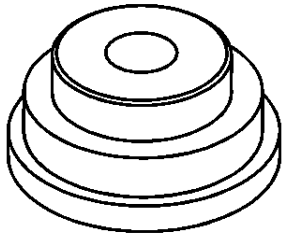
J 38868
Output Shaft Assembly Remover and Installer



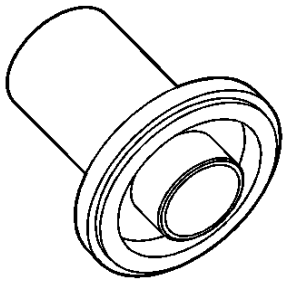
J 44017
Shaft Remover



J 44809
Output Shaft Seal Installer

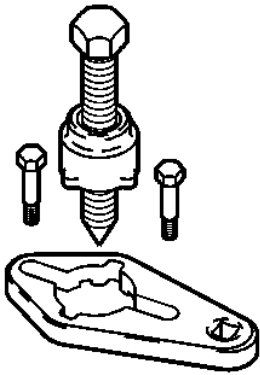


J 44871
Hub Seal Installer

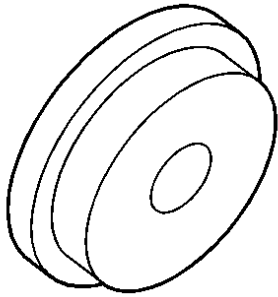


J 44872
Pinion Shaft Seal Installer

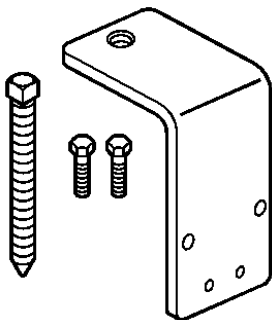
J 44873
Shoulder Bolts



J 44875
Right Bearing Race Installer



J 44882
Pinion Press Support Bar



SA 9133T
Slide Hammer

