2008 Driveline/Axle

Rear Drive Axle - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

SPECIFICATIONS

AXLE PRELOAD AND BACKLASH SPECIFICATIONS

Application	Specification	
	Metric	English
Backlash	0.08-0.25 mm	0.003-0.010 in
Backlash, Preferred	0.13-0.18 mm	0.005-0.007 in
Pinion and Differential Case Bearing Preload, New Bearings	3.4-6.2 N.m	30-55 lb in
Pinion and Differential Case Bearing Preload, Used Bearings	2.8-5.1 N.m	25-45 lb in
Pinion Bearing Preload, New Bearings	1.7-3.4 N.m	15-30 lb in
Pinion Bearing Preload, Used Bearings	1.1-2.3 N.m	10-20 lb in

DIFFERENTIAL ADJUSTMENT SHIM SPECIFICATIONS

8.6 Inch Axle Differential Adjustment Shims Specifications

Number of Notches		Specification	
Inside	Outside	Metric	English
0	3	1.02 mm	0.040"
0	4	1.07 mm	0.042"
0	5	1.12 mm	0.044"
1	1	1.17 mm	0.046"
1	2	1.22 mm	0.048"
1	3	1.27 mm	0.050"
1	4	1.32 mm	0.052"
1	5	1.37 mm	0.054"
2	1	1.42 mm	0.056"
2	2	1.47 mm	0.058"
2	3	1.52 mm	0.060"
2	4	1.58 mm	0.062"
2	5	1.63 mm	0.064"

3	1	1.68 mm	0.066"
3	2	1.73 mm	0.068"
3	3	1.78 mm	0.070"
3	4	1.83 mm	0.072"
3	5	1.88 mm	0.074"
4	1	1.93 mm	0.076"
4	2	1.98 mm	0.078"
4	3	2.03 mm	0.080"
4	4	2.08 mm	0.082"
4	5	2.13 mm	0.084"
5	1	2.18 mm	0.086"
5	2	2.24 mm	0.088"
5	3	2.29 mm	0.090"
5	4	2.34 mm	0.092"
5	5	2.39 mm	0.094"
6	1	2.38 mm	0.096"
6	2	2.49 mm	0.098"
6	3	2.54 mm	0.100"

9.5/9.5LD Inch Axle Differential Adjustment Shims Specifications

# of Stripes	Color	Specification	
		Metric	English
1	Orange	5.59 mm	0.220"
2	Orange	5.64 mm	0.222"
3	Orange	5.69 mm	0.224"
4	Orange	5.74 mm	0.226"
5	Orange	5.79 mm	0.228"
1	Yellow	5.84 mm	0.230"
2	Yellow	5.89 mm	0.232"
3	Yellow	5.94 mm	0.234"
4	Yellow	5.99 mm	0.236"
5	Yellow	6.05 mm	0.238"
1	White	6.10 mm	0.240"
2	White	6.15 mm	0.242"
3	White	6.20 mm	0.244"

4	White	6.25 mm	0.246"
5	White	6.30 mm	0.248"
1	Green	6.35 mm	0.250"
2	Green	6.40 mm	0.252"
3	Green	6.45 mm	0.254"
4	Green	6.50 mm	0.256"
5	Green	6.55 mm	0.258"

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Axle Flange Bolt (10.5 Inch Axle)	156 N.m	115 lb ft
Axle Flange Bolt (11.5 Inch Axle)	185 N.m	136 lb ft
Bearing Cap Bolt (8.6 Inch Axle)	75 N.m	55 lb ft
Bearing Cap Bolt (9.5/9.5 Inch LD Axles)	85 N.m	63 lb ft
Bearing Cap Bolt (10.5 Inch Axle)	185 N.m	136 lb ft
Bearing Cap Bolt (11.5 Inch Axle)	207 N.m	153 lb ft
Brake Backing Plate Bolt	135 N.m	100 lb ft
Brake Hose Bracket Bolt	22 N.m	16 lb ft
Brake Pipe Bracket to Rear Axle Bolt	22 N.m	16 lb ft
Brake Pipe Bracket to Rear Axle Nut	13 N.m	115 lb in
Brake Pipe Junction Block Bolt	22 N.m	16 lb ft
Differential Bearing Adjuster Nut Lock Bolt (9.5/9.5 Inch LD Axles)	26 N.m	19 lb ft
Differential Bearing Adjuster Nut Lock Bolt (10.5 Inch Axle)	27 N.m	20 lb ft
Differential Bearing Adjuster Nut Lock Bolt (11.5 Inch Axle)	27 N.m	20 lb ft
Fill Plug	33 N.m	24 lb ft
Flex Hose Bracket Bolt	12 N.m	106 lb in
Pinion Gear Bearing Retainer Bolt (10.5 Inch Axle)	88 N.m	65 lb ft
Pinion Shaft Lock Bolt (8.6 Inch Axle)	36 N.m	27 lb ft
Pinion Shaft Lock Bolt (9.5/9.5 Inch LD Axles)	50 N.m	37 lb ft
Propeller Shaft Yoke Retainer Bolt	25 N.m	18 lb ft
Rear Axle Housing Cover Bolt	40 N.m	30 lb ft

Ring Gear Bolt (8.6 Inch Axle)	120 N.m	89 lb ft
Ring Gear Bolt (9.5/9.5 Inch LD Axle)	140 N.m	103 lb ft
Ring Gear Bolt (10.5 Inch Axle)	165 N.m	122 lb ft
Ring Gear Bolt (11.5 Inch Axle)	237 N.m	175 lb ft
Shock Absorber Nut - Lower	95 N.m	70 lb ft
Stabilizer Shaft Link Bolt	95 N.m	70 lb ft
Stabilizer Shaft U-bolt Nut	32 N.m	24 lb ft
U-bolt Nut	72 N.m	53 lb ft
U-bolt Nut (25/35 Series)	150 N.m	110 lb ft
Wheel Hub Nut (10.5/11.5 Inch Axles)	70 N.m	52 lb ft

SEALERS, ADHESIVES, AND LUBRICANTS

Application	Type of Material	GM Part Number
Rear Drive Axle	Lubricant	SAE 75W-90 Synthetic Axle Lubricant 89021677 (Canadian P/N 89021678) or equivalent meeting GM Specification 9986115
Pinion Gear Bearing Retainer	Sealant	1052942 (Canadian P/N 10953466) or equivalent
Pinion Yoke Splines	Sealant	12346004 (Canadian P/N 10953480) or equivalent

LOCKING DIFFERENTIAL THRUST BLOCK SIZES

Color Code	8.6" Axle	9.5" Axle	10.5" Axle	11.5" Axle
Blue	34.290 mm (1.350")	40.488 mm (1.594")	40.488 mm (1.594")	46.055 mm (1.813")
Purple	33.578 mm (1.322")	40.589 mm (1.598")	40.589 mm (1.598")	46.155 mm (1.817")
White	33.680 mm (1.326")	40.691 mm (1.602")	40.691 mm (1.602")	46.255 mm (1.821")
Brown	33.782 mm (1.330")	40.792 mm (1.606")	40.792 mm (1.606")	46.355 mm (1.825")
Yellow	33.883 mm (1.334")	40.894 mm (1.610")	40.894 mm (1.610")	46.455 mm (1.829")

Orange	33.985 mm (1.338")	40.996 mm (1.614")	40.996 mm (1.614")	46.555 mm (1.833")
Pink	34.087 mm (1.342")	41.097 mm (1.618")	41.097 mm (1.618")	46.655 mm (1.837")
Green	34.188 mm (1.346")	41.199 mm (1.622")	41.199 mm (1.622")	46.755 mm (1.841")

COMPONENT LOCATOR

LOCKING DIFFERENTIAL DISASSEMBLED VIEWS

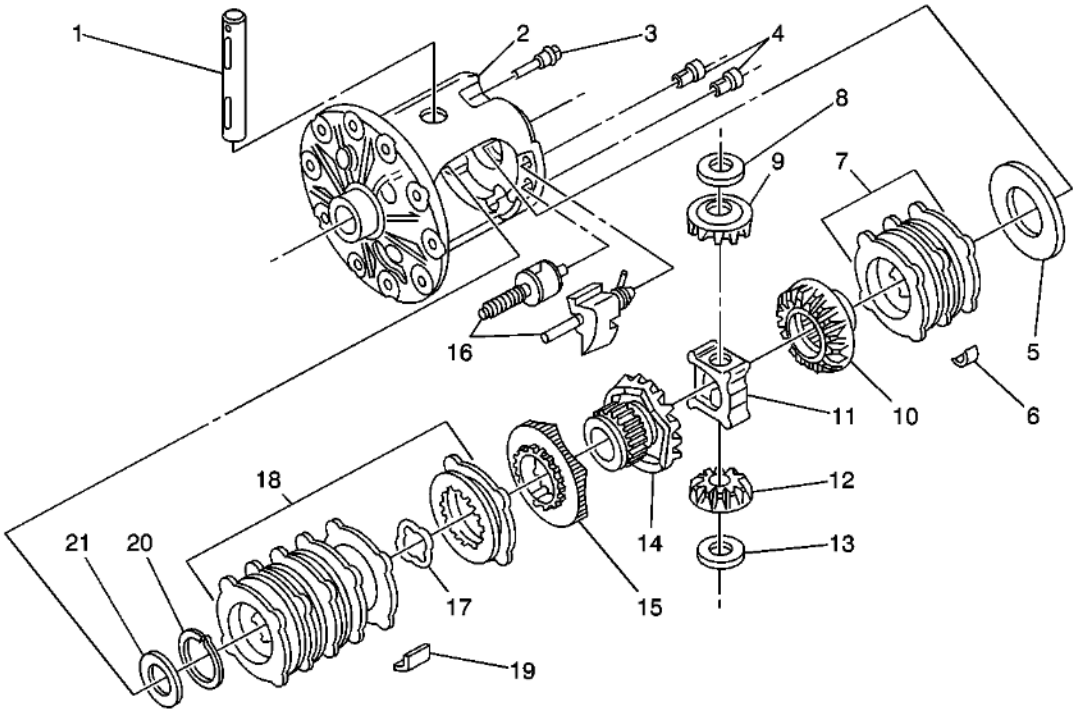


Fig. 1: 8.6 Locking Differential Disassembled View
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Differential Pinion Gear Shaft
2	Differential Case
3	Differential Pinion Gear Shaft Lock Bolt
4	Locking Differential Lockout Bushings

5	Locking Differential Clutch Disc Thrust Washer
6	Locking Differential Clutch Disc Guide
7	Locking Differential Clutch Disc Set
8	Differential Pinion Gear Thrust Washer
9	Differential Pinion Gear
10	Locking Differential Side Gear
11	Locking Differential Thrust Block
12	Differential Pinion Gear
13	Differential Pinion Gear Thrust Washer
14	Locking Differential Side Gear, Cam-Faced
15	Locking Differential Cam
16	Locking Differential Governor
17	Wave Washer
18	Locking Differential Clutch Disc Set
19	Locking Differential Clutch Disc Guide
20	Locking Differential Snap Ring Retainer
21	Locking Differential Clutch Disc Thrust Washer

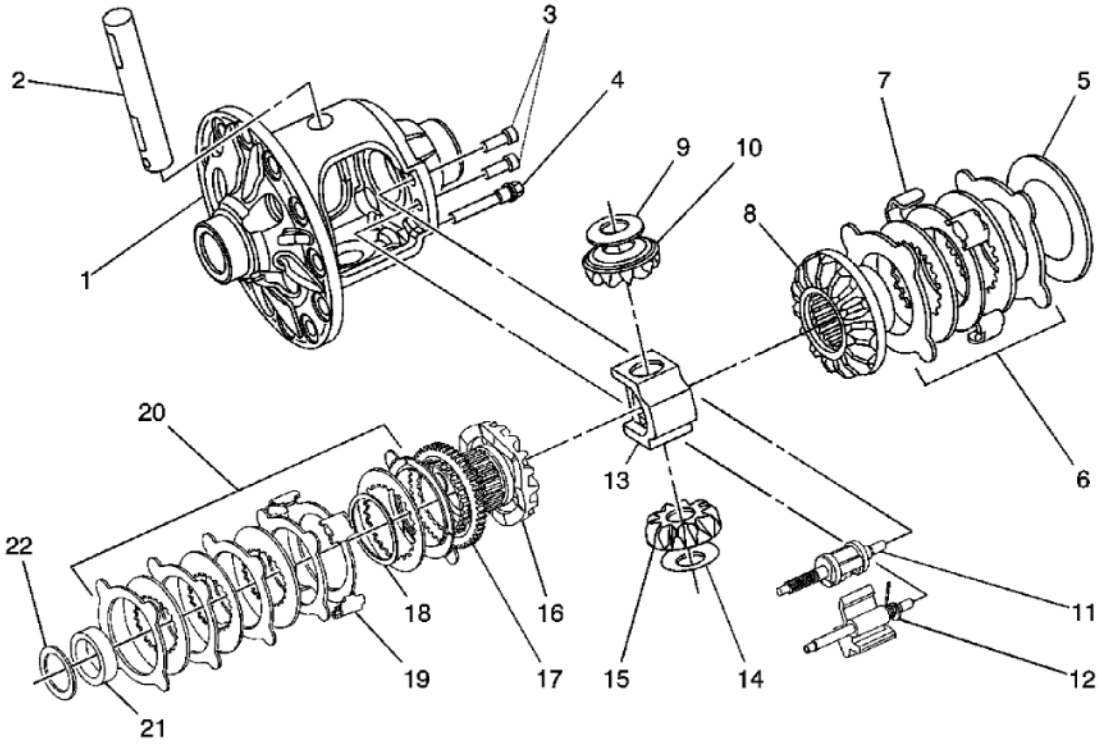


Fig. 2: 9.5 Locking Differential Disassembled View
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Differential Case
2	Differential Pinion Gear Shaft
3	Locking Differential Lockout Bushing
4	Differential Pinion Gear Shaft Lock Bolt
5	Locking Differential Clutch Disc Thrust Washer
6	Locking Differential Clutch Disc Set
7	Locking Differential Clutch Disc Guide
8	Locking Differential Side Gear
9	Differential Pinion Gear Thrust Washer
10	Differential Pinion Gear
11	Locking Differential Governor
12	Locking Differential Latching Bracket
13	Locking Differential Thrust Block
14	Differential Pinion Gear Thrust Washer
15	Differential Pinion Gear
16	Locking Differential Side Gear, Cam-Faced
17	Locking Differential Cam
18	Wave Washer
19	Locking Differential Clutch Disc Guide
20	Locking Differential Clutch Disc Set
21	Locking Differential Side Gear Thrust Sleeve
22	Differential Side Gear Shim

REAR AXLE DISASSEMBLED VIEWS

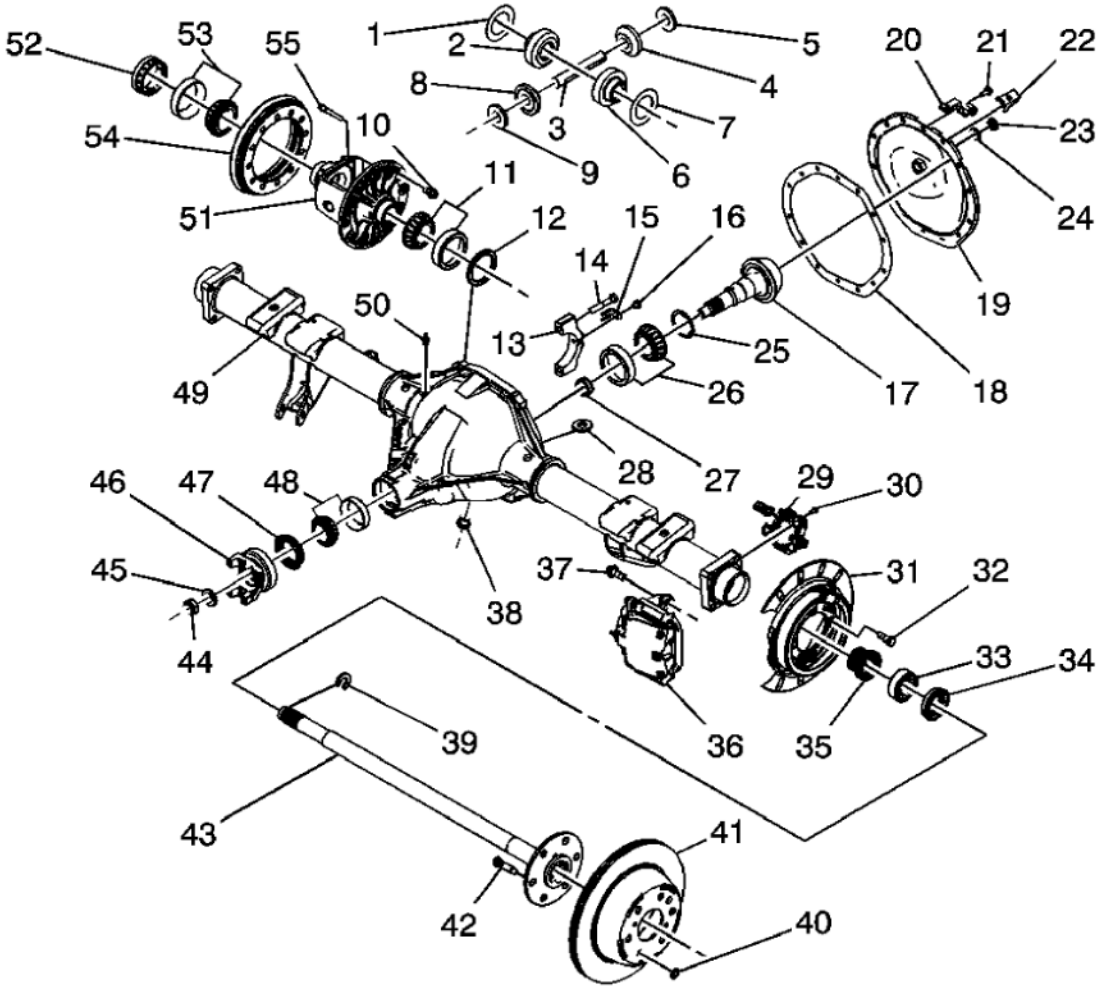


Fig. 3: 9.5 inch Rear Axle w/ Disc Brake
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Differential Side Gear Thrust Washer
2	Differential Side Gear
3	Differential Cross Shaft
4	Differential Pinion Gear
5	Differential Pinion Gear Thrust Washer
6	Differential Side Gear
7	Differential Side Gear Thrust Washer
8	Differential Pinion Gear
9	Differential Pinion Gear Thrust Washer

10	Ring Gear Bolt
11	Differential Case Bearing Assembly
12	Differential Case Bearing Shim
13	Differential Bearing Cap
14	Differential Bearing Cap Bolt
15	Differential Bearing Adjuster Lock
16	Differential Bearing Adjuster Lock Bolt
17	Drive Pinion
18	Cover Pan Gasket
19	Cover Pan
20	Brake Cable Bracket
21	Cover Pan Bolt
22	Brake Line Bracket
23	Fill Plug
24	Fill Plug Washer
25	Pinion Bearing Shim
26	Pinion Head Bearing Assembly
27	Pinion Bearing Spacer
28	Differential Carrier Magnet
29	VSES Sensor Assembly
30	VSES Sensor Bolt
31	Park Brake Assembly
32	Park Brake Attachment Bolt
33	Axle Shaft Bearing Assembly
34	Axle Shaft Seal Assembly
35	VSES Exciter Ring Assembly
36	Caliper Assembly
37	Caliper Bolt
38	Carrier Drain Plug
39	Axle Shaft C-Lock
40	Push Nut
41	Brake Rotor
42	Wheel Stud
43	Axle Shaft
44	Pinion Flange Nut

	Pinion Flange Washer
46	Pinion Flange Assembly
47	Pinion Flange Seal Assembly
48	Pinion Tail Bearing Assembly
49	Axle Housing Assembly
50	Vent Hose Connector
51	Differential Case
52	Differential Case Bearing Adjuster
53	Differential Case Bearing Assembly
54	Ring Gear
55	Differential Cross Shaft Lock Screw

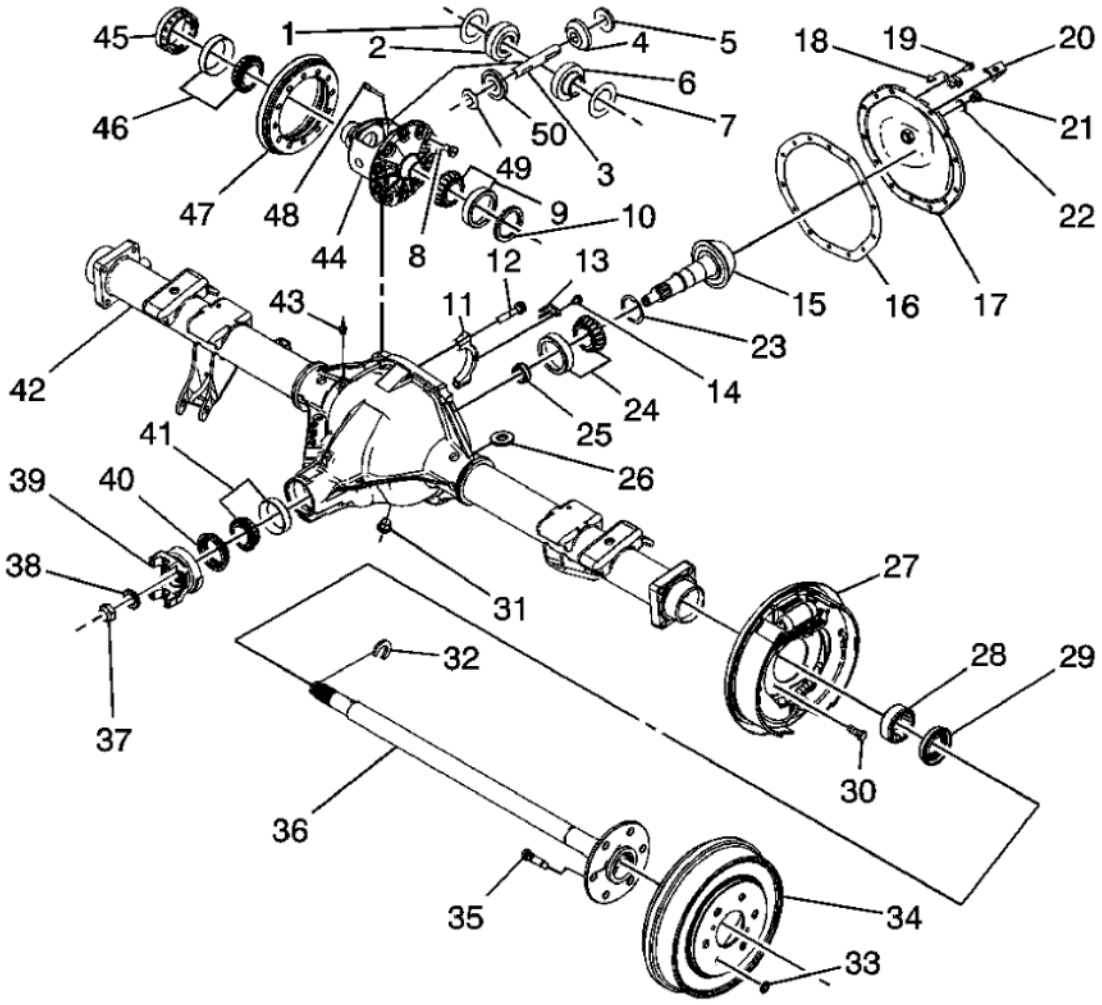


Fig. 4: Rear Axle w/ Drum Brake 9.5 inch

Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Differential Side Gear Thrust Washer
2	Differential Side Gear
3	Differential Cross Shaft
4	Differential Pinion Gear
5	Differential Pinion Gear Thrust Washer
6	Differential Side Gear
7	Differential Side Gear Thrust Washer
8	Ring Gear Bolt
9	Differential Case Bearing Assembly
10	Differential Case Bearing Shim
11	Differential Bearing Cap
12	Differential Bearing Cap Bolt
13	Differential Bearing Adjuster Lock
14	Differential Bearing Adjuster Lock Bolt
15	Drive Pinion
16	Cover Pan Gasket
17	Cover Pan
18	Brake Cable Bracket
19	Cover Pan Bolt
20	Brake Line Bracket
21	Fill Plug
22	Fill Plug Washer
23	Pinion Bearing Shim
24	Pinion Head Bearing Assembly
25	Pinion Bearing Spacer
26	Differential Carrier Magnet
27	Brake Assembly
28	Axle Shaft Bearing Assembly
29	Axle Shaft Seal Assembly
30	Brake Assembly Attachment Bolt
31	Carrier Drain Plug
32	Axle Shaft C-Lock

33	Push Nut
34	Brake Drum
35	Wheel Stud
36	Axle Shaft
37	Pinion Flange Nut
38	Pinion Flange Washer
39	Pinion Flange Assembly
40	Pinion Flange Seal Assembly
41	Pinion Tail Bearing Assembly
42	Axle Housing Assembly
43	Vent Hose Connector
44	Differential Case
45	Differential Case Bearing Adjuster
46	Differential Case Bearing Assembly
47	Ring Gear
48	Differential Cross Shaft Lock Screw
49	Differential Pinion Gear Thrust Washer
50	Differential Pinion Gear

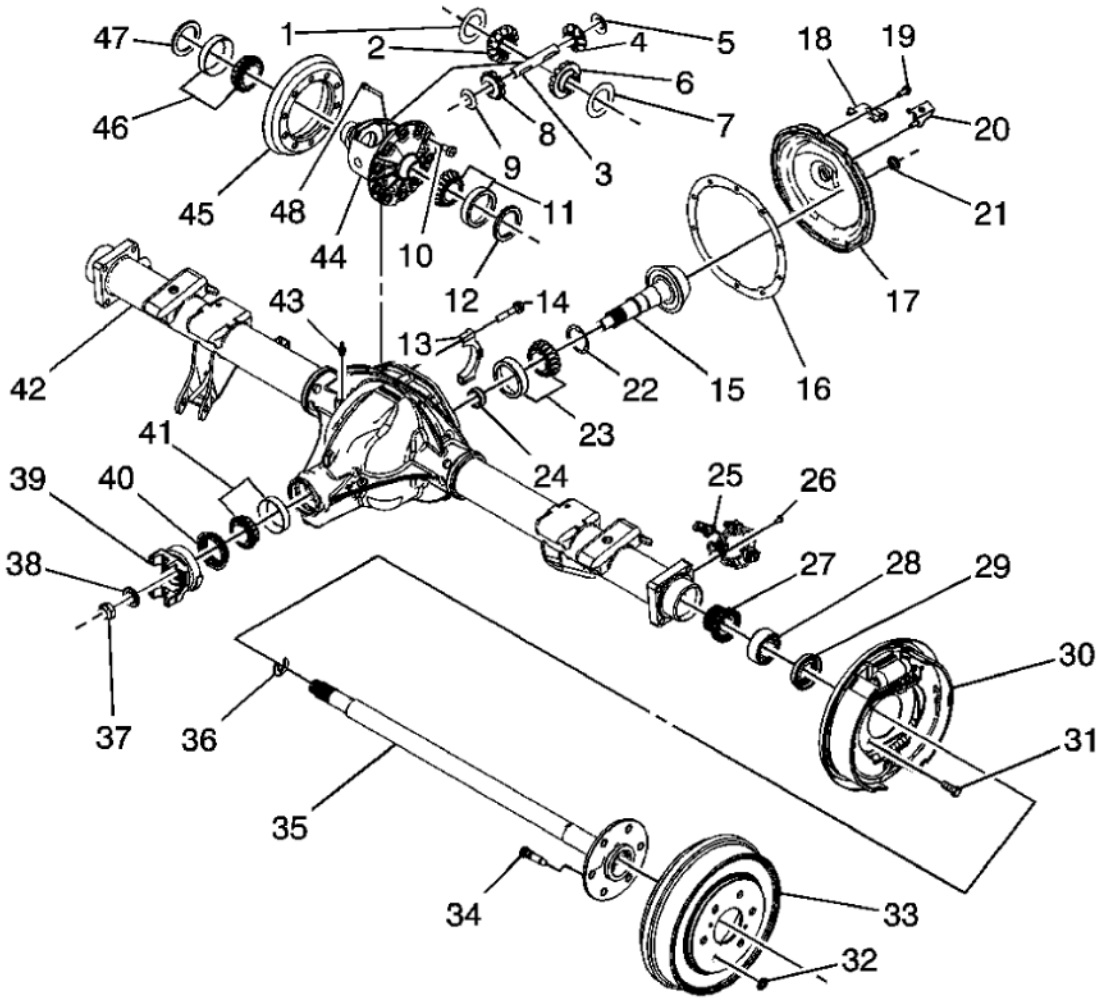


Fig. 5: Rear Axle with VSES and Drum Brake 8.6 inch
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Differential Side Gear Thrust Washer
2	Differential Side Gear
3	Differential Cross Pin
4	Differential Pinion Gear
5	Differential Pinion Thrust Washer
6	Differential Side Gear
7	Differential Side Gear Thrust Washer
8	Differential Pinion Gear
9	Differential Pinion Gear Thrust Washer

10	Ring Gear Bolt
11	Differential Case Bearing Assembly
12	Differential Case Bearing Shim
13	Carrier Bearing Cap
14	Carrier Bearing Cap Bolt
15	Drive Pinion
16	Cover Pan Gasket
17	Cover Pan
18	Cover Pan Clip
19	Cover Pan Bolt
20	Cover Pan Bracket Assembly
21	Fill Plug Assembly
22	Drive Pinion Bearing Shim
23	Drive Pinion Head Bearing Assembly
24	Drive Pinion Bearing Spacer
25	VSES Sensor Assembly
26	VSES Sensor Bolt
27	VSES Exciter Ring Assembly
28	Axle Shaft Bearing Assembly
29	Axle Shaft Seal Assembly
30	Drum Brake Assembly
31	Brake Attaching Bolt
32	Push Nut
33	Brake Drum
34	Wheel Stud
35	Axle Shaft
36	Axle Shaft C-Lock
37	Pinion Flange Nut
38	Pinion Flange Washer
39	Pinion Flange Assembly
40	Pinion Flange Seal Assembly
41	Drive Pinion Tail Bearing Assembly
42	Axle Housing Assembly
43	Vent Connector
44	Differential Case

	Ring Gear
46	Differential Case Bearing Assembly
47	Differential Case Bearing Shim
48	Differential Cross Pin Lock Screw

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - LOCKING/LIMITED SLIP REAR AXLE

Begin the system diagnosis by reviewing the system Description and Operation. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exist. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Locking/Limited Slip Rear Axle** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

DIAGNOSTIC STARTING POINT - REAR DRIVE AXLE

Begin the system diagnosis by reviewing the system 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 - Locking/Limited Slip Rear Axle** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

SYMPTOMS - LOCKING/LIMITED SLIP REAR AXLE

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

Visual/Physical Inspection

- Inspect the system for the following:
  - Loose or missing fasteners
  - Obvious damage or conditions which may cause the symptom.
- Check the system for proper operation. Refer to **Locking Differential Diagnosis**.

Symptom List

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

- **Locking Rear Axle Does Not Lock**
- **Locking Rear Axle Locks in Turns**
- **Locking Rear Drive Axle Chatters in Turns**
- **Noise in Addition to Normal Clutch Engagement**

SYMPTOMS - REAR DRIVE AXLE

Review the system and operation in order to familiarize yourself with the system functions. Refer to **Rear Drive Axle Description and Operation**.

Rear Axle Noise

The proper diagnosis is an important part of rear axle repair. In axle work, one of the most difficult conditions to diagnose is noise. Locating a broken axle shaft or broken differential gear presents little or no problems, but locating and isolating axle noise can be an entirely different matter.

Any gear driven unit, especially an automotive drive axle where the engine torque multiplication occurs at a 90 degree turn in the driveline, produces a certain amount of noise. Therefore, an interpretation must be made for each vehicle in order to determine where the noise is normal or if a problem actually exists. A certain amount of noise must be expected and cannot be eliminated by conventional repairs or adjustment.

Normal axle noise can be described as a slight noise heard only at a certain speed or under unusual or remote conditions. For example, the noise tends to reach a peak at speeds from 60-100 km/h (40-60 mph) depending on road and load conditions, or on gear ratio and tire size. This slight noise is in no way indicative of trouble in the axle assembly.

Driveline noises may confuse even the best technician. Vehicle noises coming from tires, transmission, propeller shaft, universal joints, and front or rear wheel bearings are often mistaken for axle noise.

Visual/Physical Inspection

- Inspect the system for loose or missing fasteners.
- Inspect the system for leaking components.
- Inspect the system for obvious damage or conditions which may cause the symptom.

Symptom List

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

- **Rear Drive Axle Noises**
- **Noisy in Drive**
- **Noisy When Coasting**
- **Intermittent Noise**
- **Constant Noise**
- **Noisy on Turns**

REAR DRIVE AXLE NOISES

Gear Noise

Gear noise or whine is audible from 32-89 km/h (20-55 mph) under 4 driving conditions:

- Drive- Acceleration or heavy pull
- Road Load-Vehicle driving load or constant speed
- Float-Using enough throttle to keep the vehicle from driving the engine, the vehicle slows down gradually but the engine still pulls slightly
- Coast-Throttle is closed and the vehicle is in gear

Gear noise most frequently has periods where the noise is more prominent, usually between 48-64 km/h (30-40 mph) and 80-85 km/h (50-53 mph). Gear whine is corrected by either ring and pinion gear replacement or adjustment, depending on the mileage of the gearset.

Bearing Noise

Faulty bearings produce a rough growl or grating sound, rather than the whine typical of gear noise. Bearing noise/hum will pulsate at a constant vehicle speed. This indicates a bad pinion or a bad rear axle side bearing. This noise can be confused with rear wheel bearing noise. Inspect and replace the bearings and the affected components as required.

Rear Wheel Bearing Noise

A rough rear wheel bearing produces a noise which continues with the car coasting at low speed and the transmission in neutral. The noise may diminish some when the brakes are gently applied. The noise may also change when performing side-to-side maneuvers with the vehicle.

A rough/noisy rear wheel bearing can be heard by spinning the rear wheels by hand and listening at the hubs for the noise. Inspect and replace the bearings and the affected components as needed.

Knock at Low Speeds

A low speed knock can be caused by a differential case side gear bore that has worn oversize. Inspect the side gears and differential case and replace the components as necessary.

Backlash Clunk

Excessive backlash clunk under acceleration or deacceleration can be caused by any of the following:

- Worn differential pinion shaft
- Worn differential pinion and/or side gear teeth
- Worn thrust washers
- Excessive clearance between the side gears and the axle shafts
- Excessive clearance between differential side gears and the bore in the case
- Excessive drive pinon and ring gear backlash

Inspect, adjust or replace the affected components as necessary.

NOISY IN DRIVE

Cause	Correction
DEFINITION: A noise heard during acceleration load.	
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
Worn pinion and ring gear	Replace the pinion and the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Worn pinion bearings	Replace the pinion bearings. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
Loose pinion bearings	Adjust the pinion bearings preload. Refer to **Pinion Depth Adjustment (10.5 Inch Axle)** or **Pinion Depth Adjustment (8.6, 9.5/9.5LD, and 11.5 Inch Axles)**.
Excessive pinion end play	Adjust the pinion end play. Refer to **Pinion Depth Adjustment (10.5 Inch Axle)** or **Pinion Depth Adjustment (8.6, 9.5/9.5LD, and 11.5 Inch Axles)**.

Worn differential bearings	Replace the differential bearings. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)**.
Loose differential bearings	Adjust the differential bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (10.5 Inch, 11.5 Inch Axles)** or **Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Carrier Bearing Preload Adjustment (9.5, and 9.5LD Inch Axles)**.
Excessive ring gear runout	Replace the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to **Rear Axle Lubricant Level Inspection (11.5 Inch Axle)** or **Rear Axle Lubricant Level Inspection (8.6, 9.5 LD Axle)** or **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
Bent axle housing	Replace the axle housing. Refer to **Rear Axle Housing Replacement (w/Rear Drum)** or **Rear Axle Housing Replacement (w/Rear Disc)**.

NOISY WHEN COASTING

Checks	Action
DEFINITION: Noise is audible when slowing down and disappears when driving.	
Worn pinion and ring gear	Adjust or replace the pinion and the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Pinion and ring gear too tight	Adjust the pinion and the ring gear backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.

INTERMITTENT NOISE

Checks	Action
Warped ring gear	Replace the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Loose differential case bolts	Tighten differential case bolts to specifications. Refer to **Fastener Tightening Specifications**.

CONSTANT NOISE

Cause	Correction
DEFINITION: A noise heard in the rear axle during all driving conditions. This noise may increase or decrease in volume based on different driving maneuvers and speeds.	
Flat spot on the pinion or the ring gear teeth	Replace the pinion and the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Flat spot on the pinion bearing	Replace the bearing. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
Worn pinion splines	Replace the pinion. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to **Rear Axle Lubricant Level Inspection (11.5 Inch Axle)** or **Rear Axle Lubricant Level Inspection (8.6, 9.5 LD Axle)** or **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
	Adjust the pinion bearings preload. Refer to **Pinion Depth**

Loose pinion bearings	**Adjustment (10.5 Inch Axle)** or **Pinion Depth Adjustment (8.6, 9.5/9.5LD, and 11.5 Inch Axles)**.
Excessive pinion end play	Adjust the pinion end play. Refer to **Pinion Depth Adjustment (10.5 Inch Axle)** or **Pinion Depth Adjustment (8.6, 9.5/9.5LD, and 11.5 Inch Axles)**.
Incorrect differential bearing preload	Adjust the differential bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (10.5 Inch, 11.5 Inch Axles)** or **Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Carrier Bearing Preload Adjustment (9.5, and 9.5LD Inch Axles)**.
Incorrect backlash	Adjust the pinion and ring gear backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
Worn pinion bearings	Replace the pinion bearings. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
Worn differential bearings	Replace the differential bearings. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)**.
Worn pinion and ring gear	Replace the pinion and ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Excessive ring gear runout	Replace the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Bent axle housing	Replace the axle housing. Refer to **Rear Axle Housing Replacement (w/Rear Drum)** or **Rear Axle Housing Replacement (w/Rear Disc)**.
Worn axle shaft dowel holes	Replace the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)** or to **Rear Axle Shaft and/or Gasket Replacement**.
Worn hub studs	Replace the wheel studs. Refer to **Wheel Stud**

	Replacement .
Bent axle shaft	Replace the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)** or **Rear Axle Shaft and/or Gasket Replacement**.

NOISY ON TURNS

Checks	Action
Worn differential side gears and pinions	Replace the differential side gears and pinions. Refer to **Differential Overhaul (11.5 Inch Axle)** or **Differential Overhaul (9.5/9.5LD Inch Axles)** or **Differential Overhaul (8.6 Inch Axle)** or **Differential Overhaul (10.5 Inch Axle)**.
Worn differential spider gears	Replace the spider gears. Refer to **Differential Overhaul (11.5 Inch Axle)** or **Differential Overhaul (9.5/9.5LD Inch Axles)** or **Differential Overhaul (8.6 Inch Axle)** or **Differential Overhaul (10.5 Inch Axle)**.
Worn axle shaft splines	Replace the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)** or **Rear Axle Shaft and/or Gasket Replacement**.

WHEEL BEARING WEAR - REAR DRIVE AXLE (STRAIGHT)

Straight Roller Bearing Diagnosis

Consider the following factors when diagnosing a bearing condition:

- Note the general condition of all parts during disassembly and inspection.
- Classify the failure with the aid of the illustrations.
- Determine the cause.
- Make all repairs following recommended procedures.

Wear (Minor)

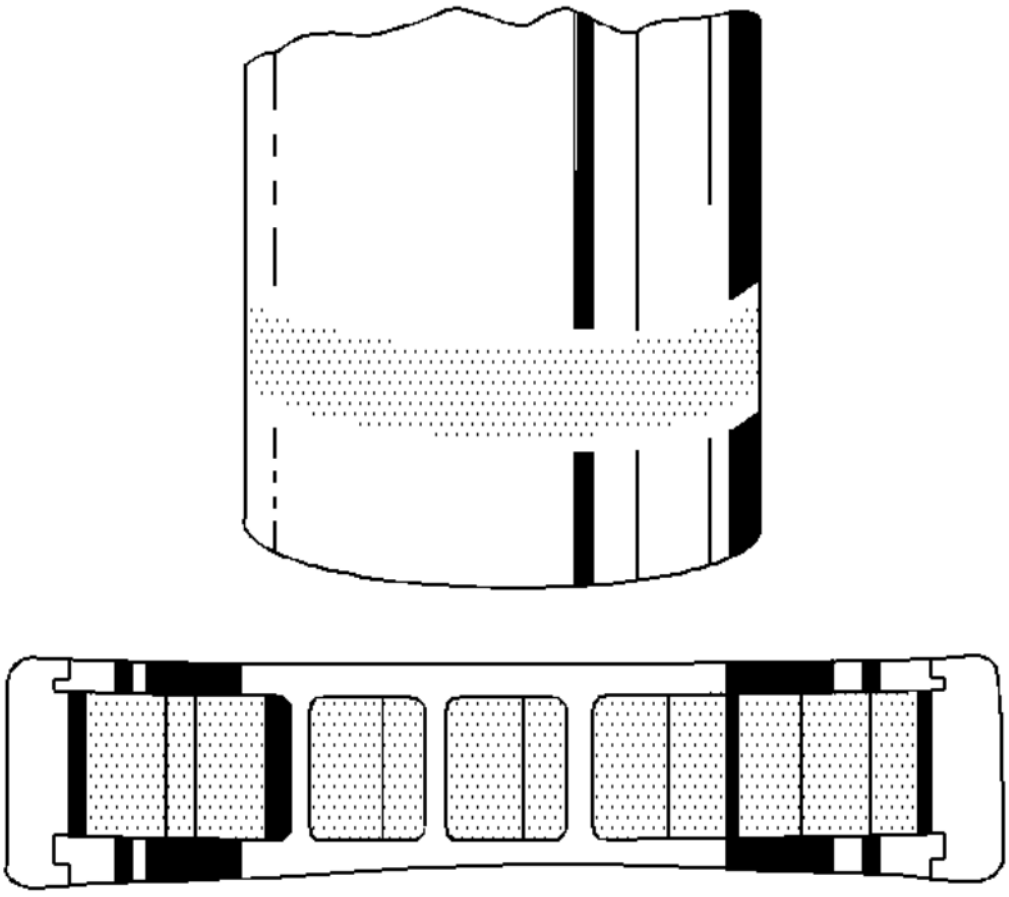


Fig. 6: Identifying Minor Wear
Courtesy of GENERAL MOTORS CORP.

Light pattern on races and rollers can be caused by fine abrasives. Clean all of the parts including the housings. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Wear (Major)

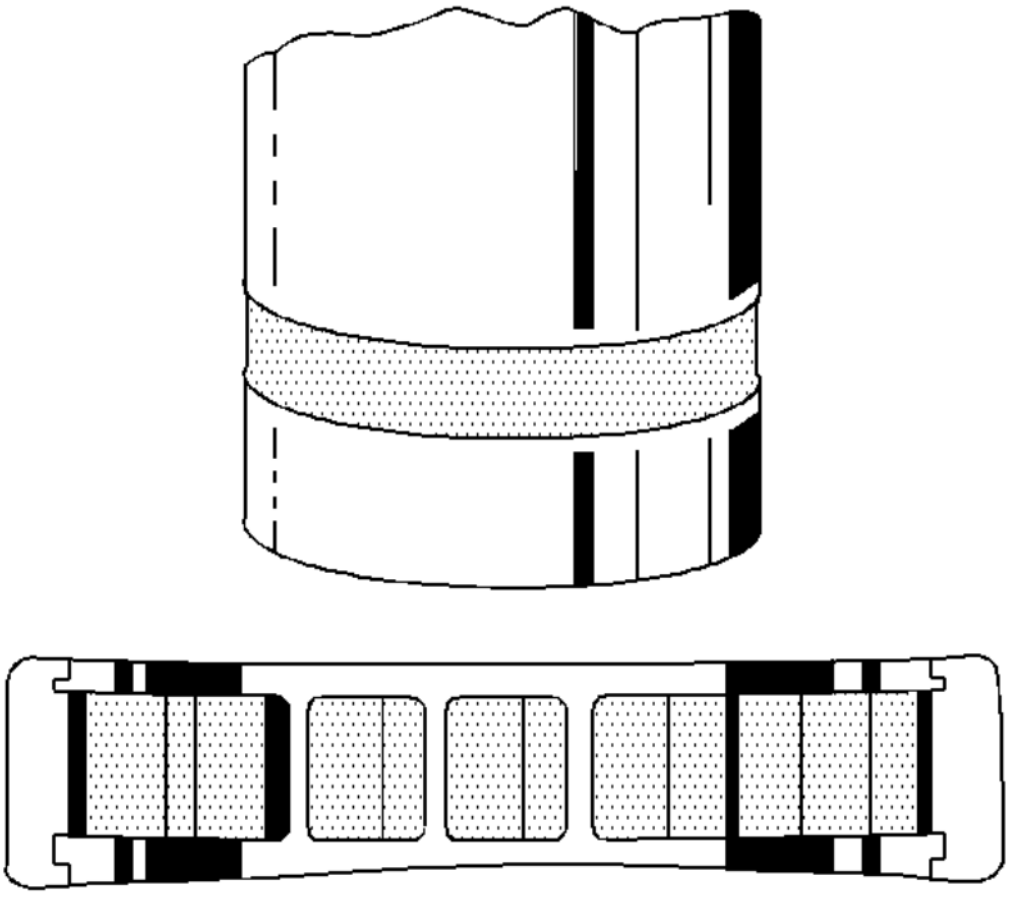


Fig. 7: Identifying Major Wear
Courtesy of GENERAL MOTORS CORP.

Heavy pattern on races and rollers can be caused by fine abrasives. Clean all of the parts including the housing. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Brinelling

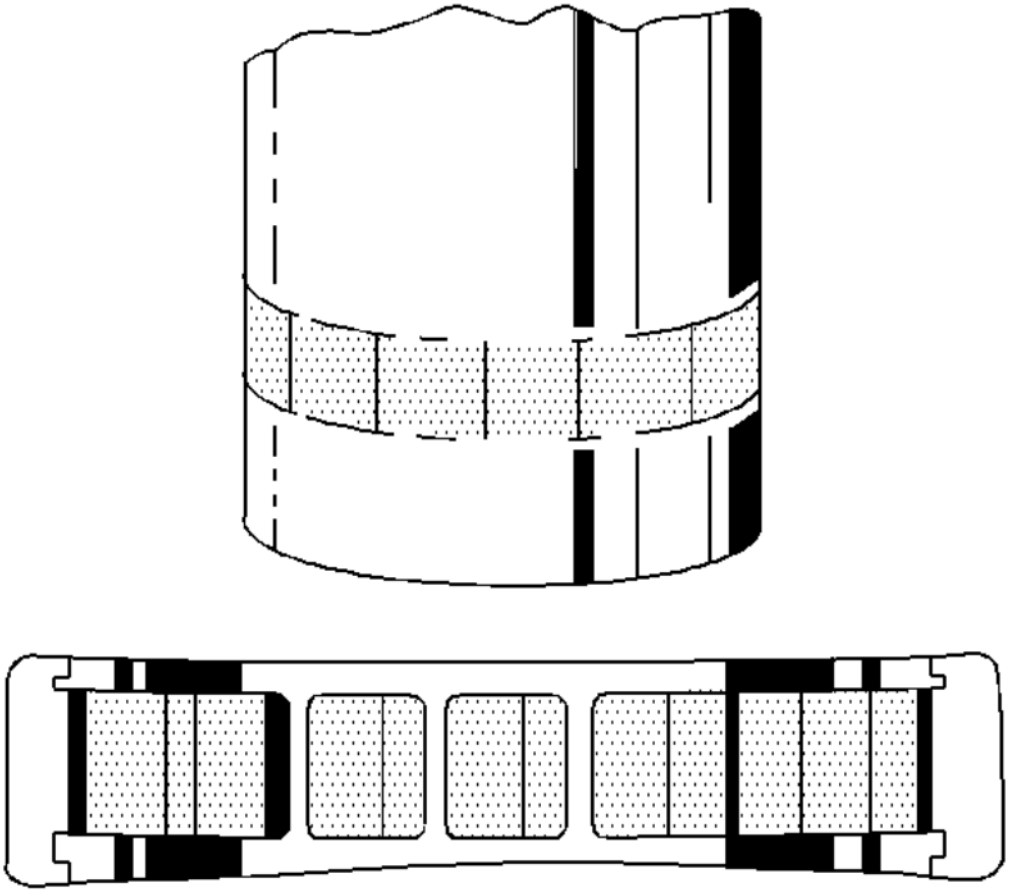


Fig. 8: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

Surface indentations in the raceway can be caused by roll either under impact loading or vibration while the bearing is not rotating. Replace the bearing if rough or noisy. Replace the shaft if damaged.

Indentations

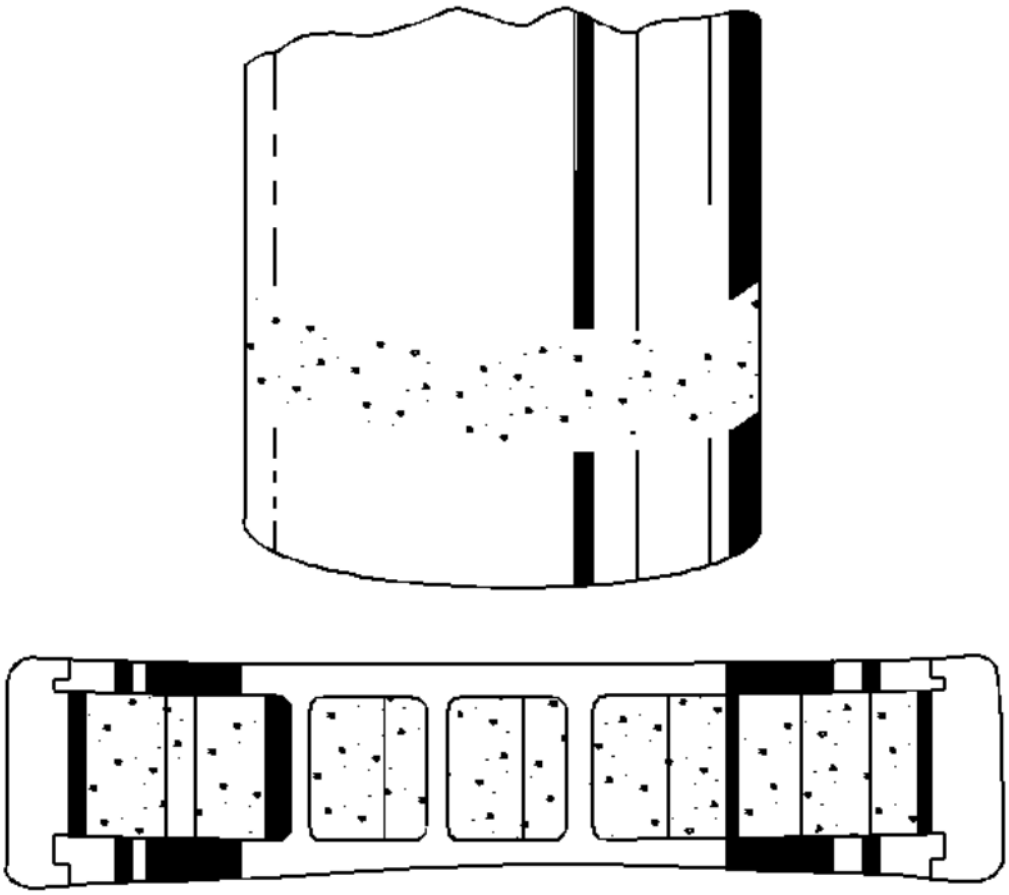


Fig. 9: Identifying Indentations
Courtesy of GENERAL MOTORS CORP.

Surface depressions on race and rollers can be caused by hard particles of foreign material. Clean all of the parts, including the housing. Check the seals. Replace the bearings if rough or noisy. Replace the shaft if damaged.

Single Edge Pitting

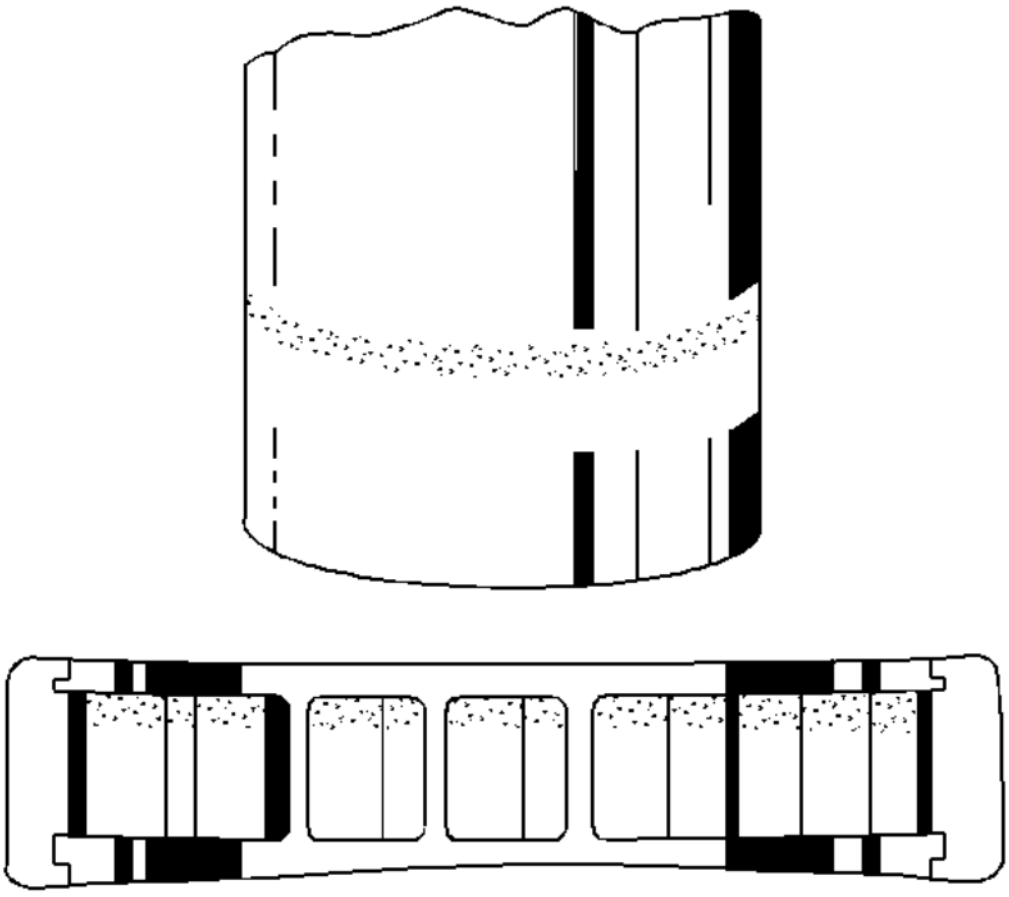


Fig. 10: Identifying Single Edge Pitting
Courtesy of GENERAL MOTORS CORP.

Flaking of surface metal results from fatigue, usually at one edge of race and rollers. Replace the bearing. Clean all related parts. Replace the shaft if damaged.

Double Edge Pitting

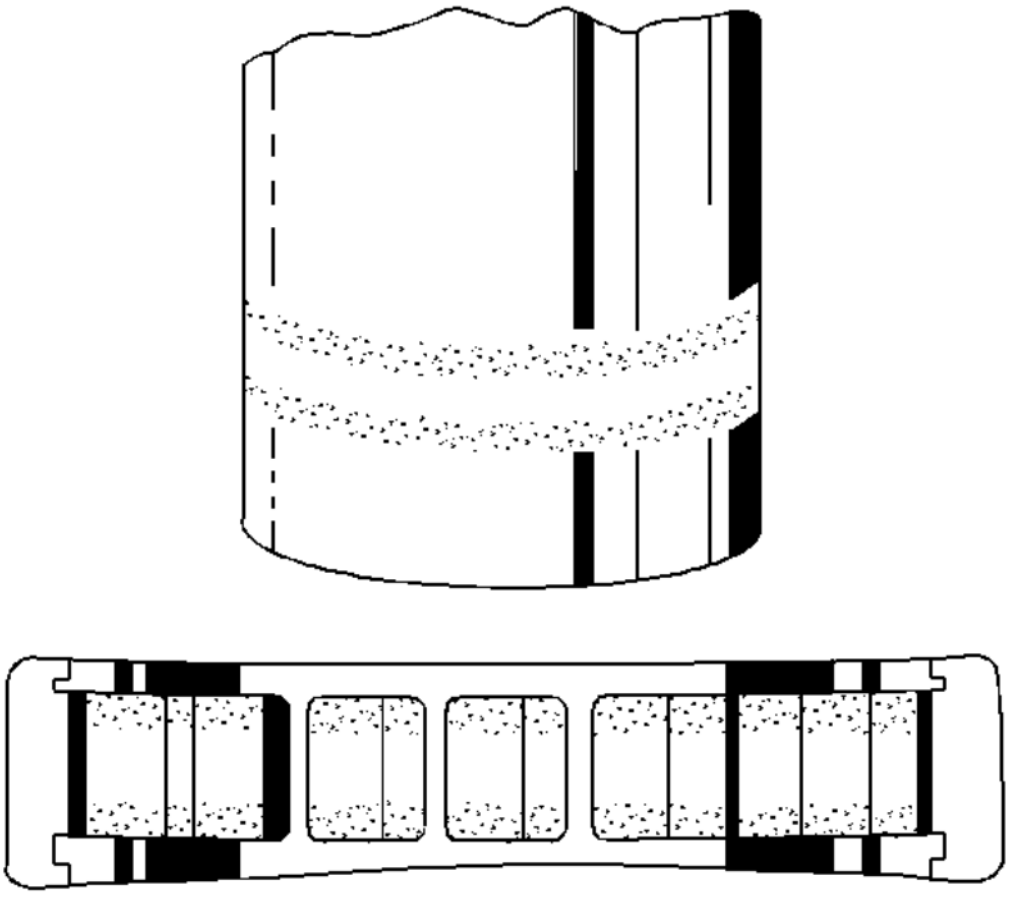


Fig. 11: Identifying Double Edge Pitting
Courtesy of GENERAL MOTORS CORP.

Flaking of surface metal results from fatigue, usually at both edges of the race and rollers. Replace the bearing. Clean all related parts. Replace the shaft if damaged.

Misalignment

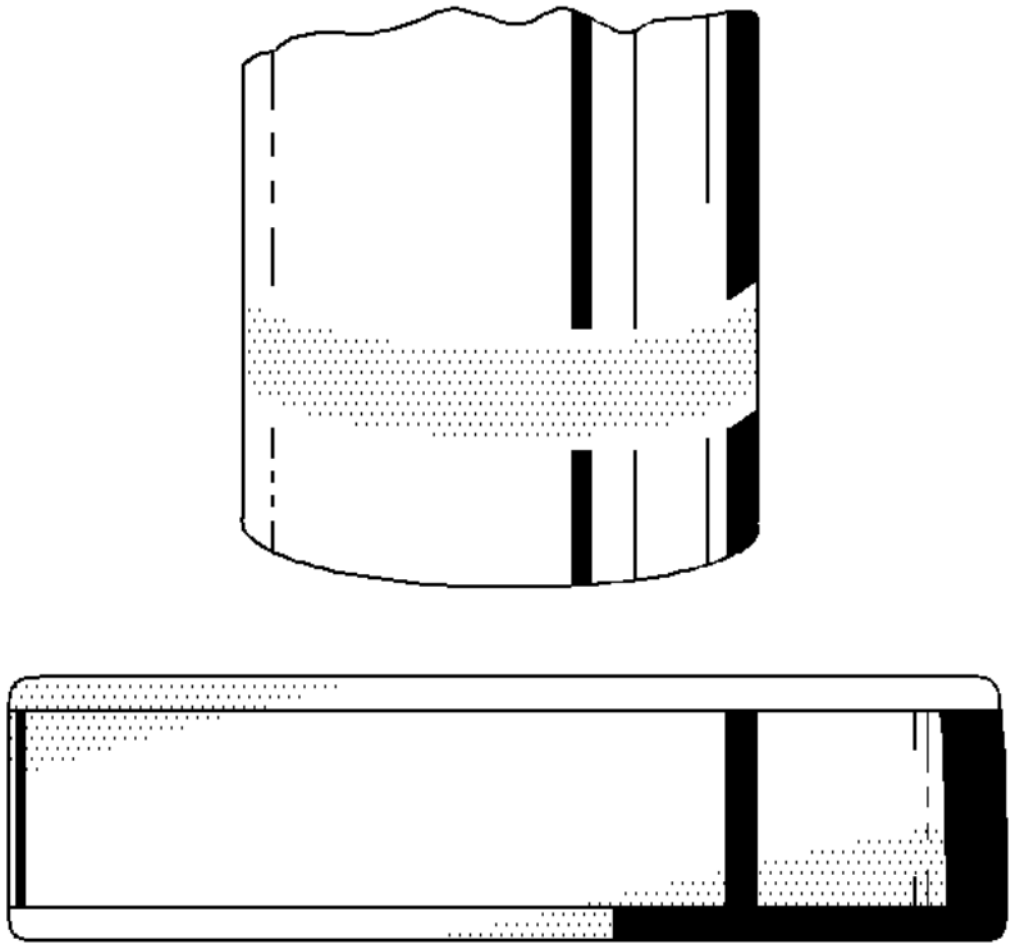


Fig. 12: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

Outer misalignment due to a foreign object. Replace the bearing. Ensure races are properly seated. Replace the shaft if the bearing operating surface is damaged.

Frettage

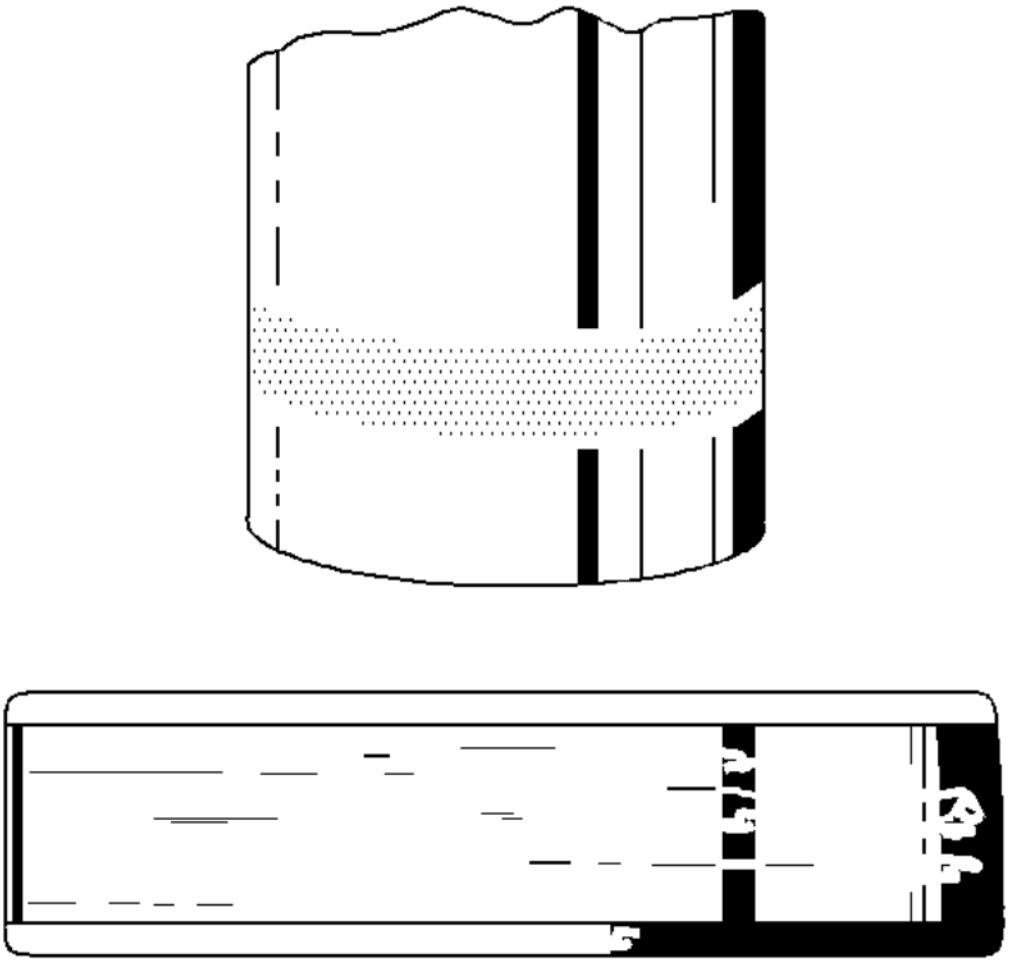


Fig. 13: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

Corrosion set up by a small relative movement of parts with no lubrication. Replace the bearing. Clean all the relative parts. Check the seals. Check for proper fit and lubrication. Replace the shaft if damaged.

Smears

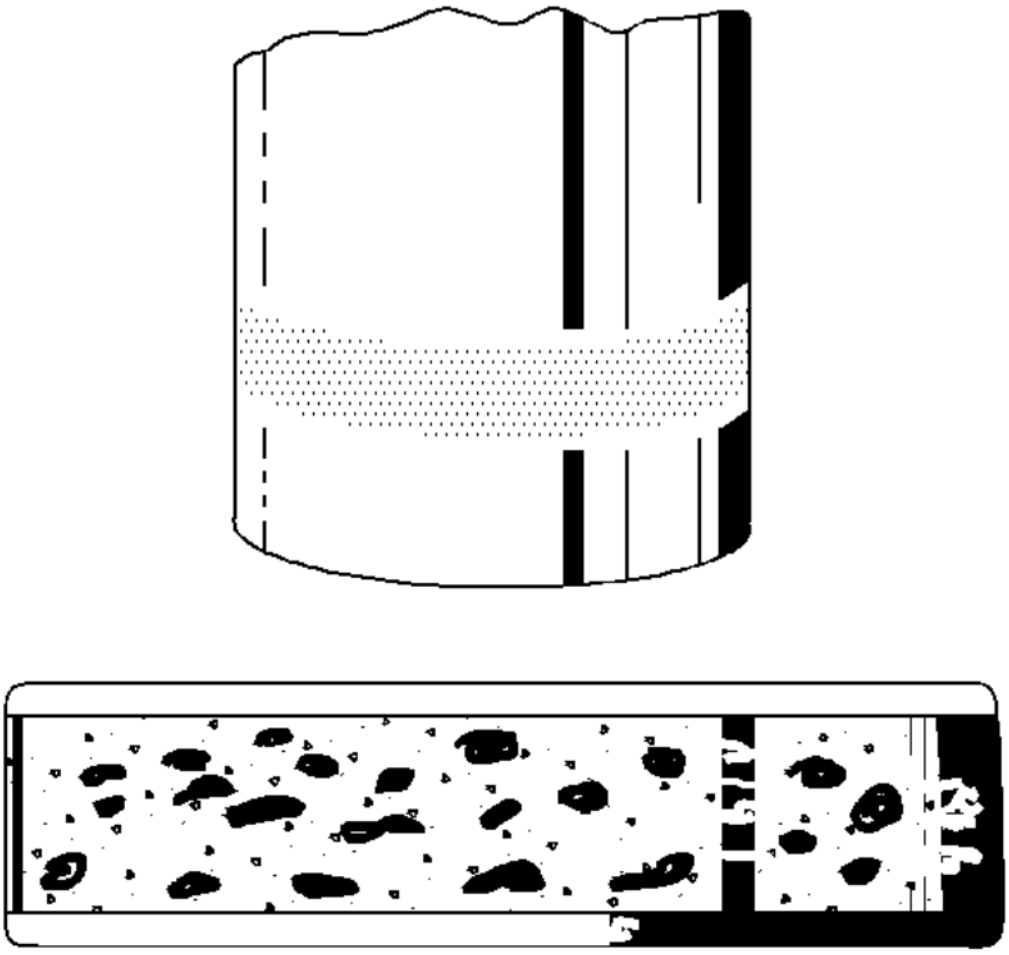


Fig. 14: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

Smearing of metal due to slippage. Slippage can be caused by poor fits, lack of lubrication, overheating, overloads or handling damage. Replace the bearing. Clean all the related parts. Check for proper fit and lubrication.

WHEEL BEARING WEAR - REAR DRIVE AXLE (TAPERED)

Tapered Roller Bearing Diagnosis

Consider the following factors when diagnosing bearing condition:

- General condition of all parts during disassembly and inspection
- Classify the failure with the aid of the illustrations.
- Determine the cause.
- Make all repairs following recommended procedures.

Abrasive Roller Wear

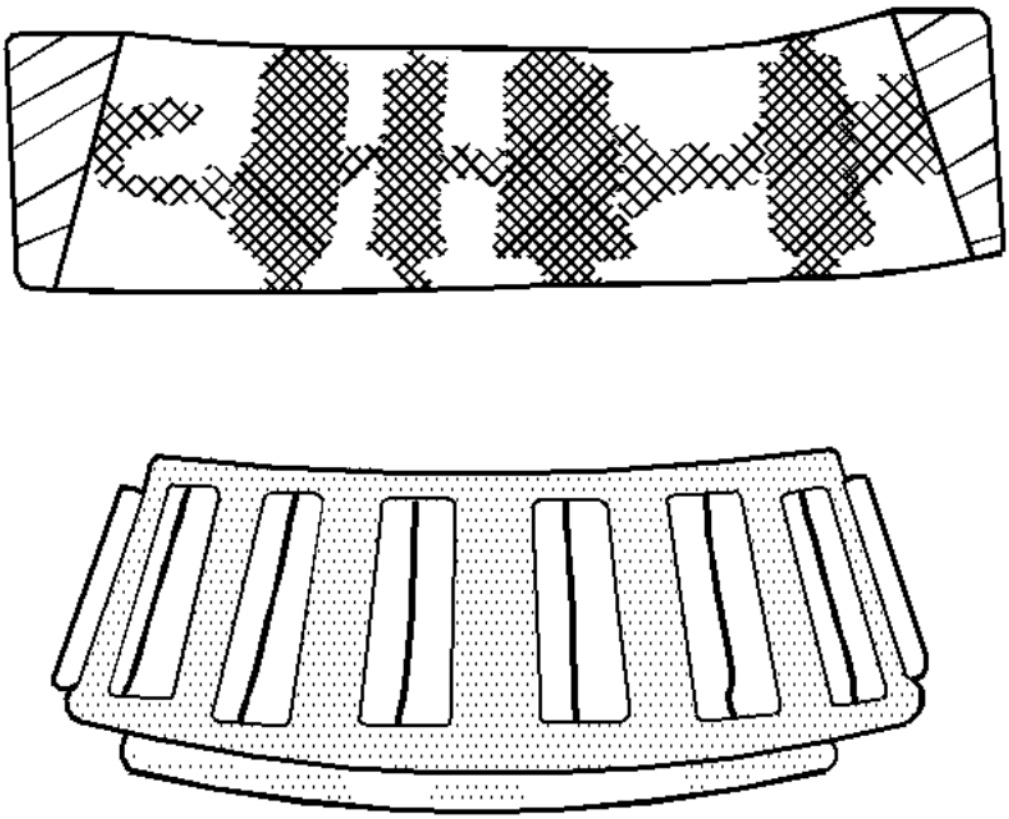


Fig. 15: Identifying Abrasive Roller Wear
Courtesy of GENERAL MOTORS CORP.

Pattern on the races and the rollers caused by fine abrasives. Clean all of the parts and the housings. Check the seals and the bearings. Replace any leaky, rough, or noisy bearings.

Abrasive Step Wear

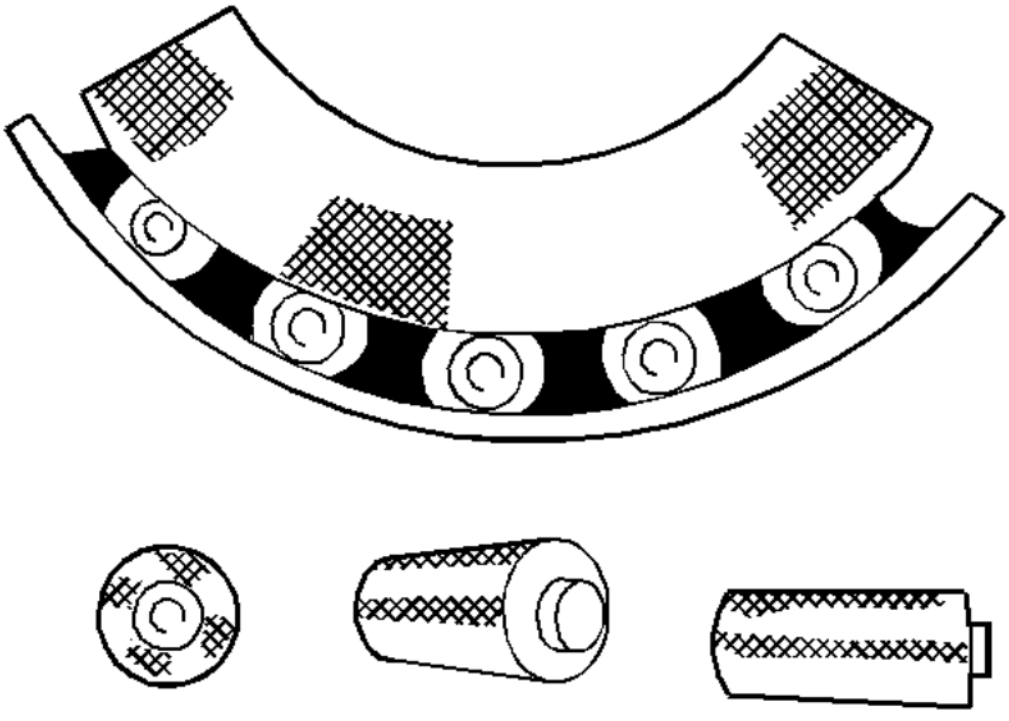


Fig. 16: Identifying Abrasive Step Wear
Courtesy of GENERAL MOTORS CORP.

Pattern on the roller ends caused by fine abrasives. Clean all of the parts and the housings. Check the seals and the bearings. Replace any leaky, rough, or noisy bearings.

Galling

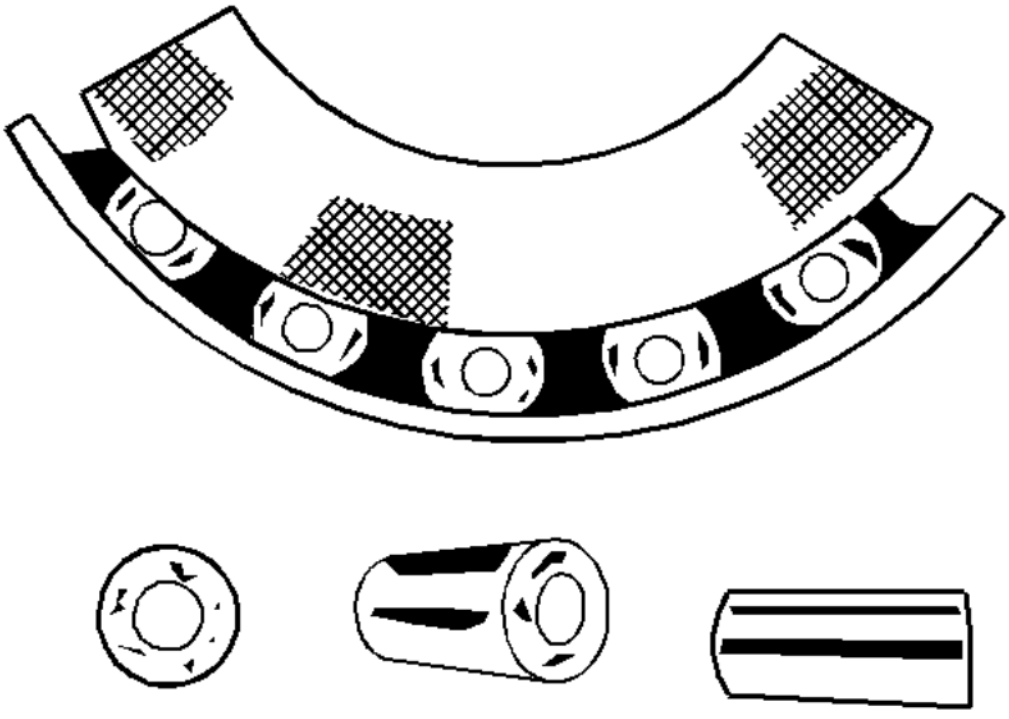


Fig. 17: Identifying Galling
Courtesy of GENERAL MOTORS CORP.

Metal smears on the roller ends due to overheating, lubricant failure, or lubricant overload. Replace the bearing. Check the seals. Check for proper lubrication.

Etching

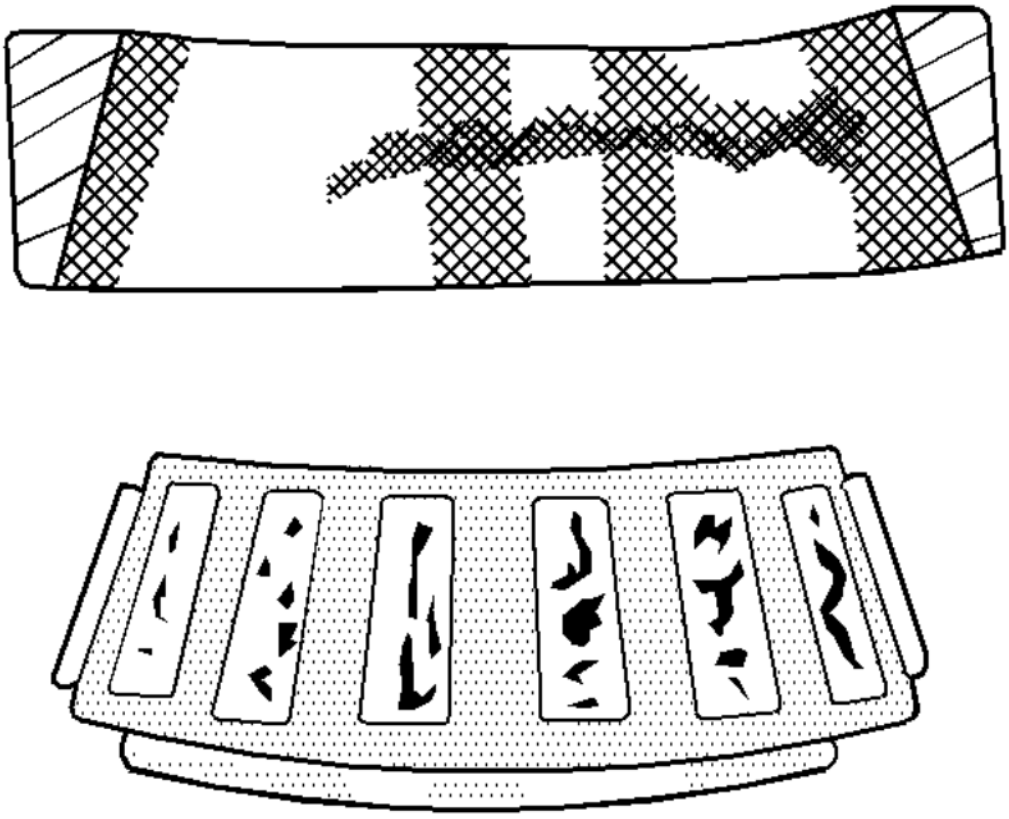


Fig. 18: Identifying Etching
Courtesy of GENERAL MOTORS CORP.

Bearing surfaces appear gray or grayish black in color, with related etching away of material usually at roller spacing. Replace the bearings. Check the seals. Check for proper lubrication.

Bent Cage

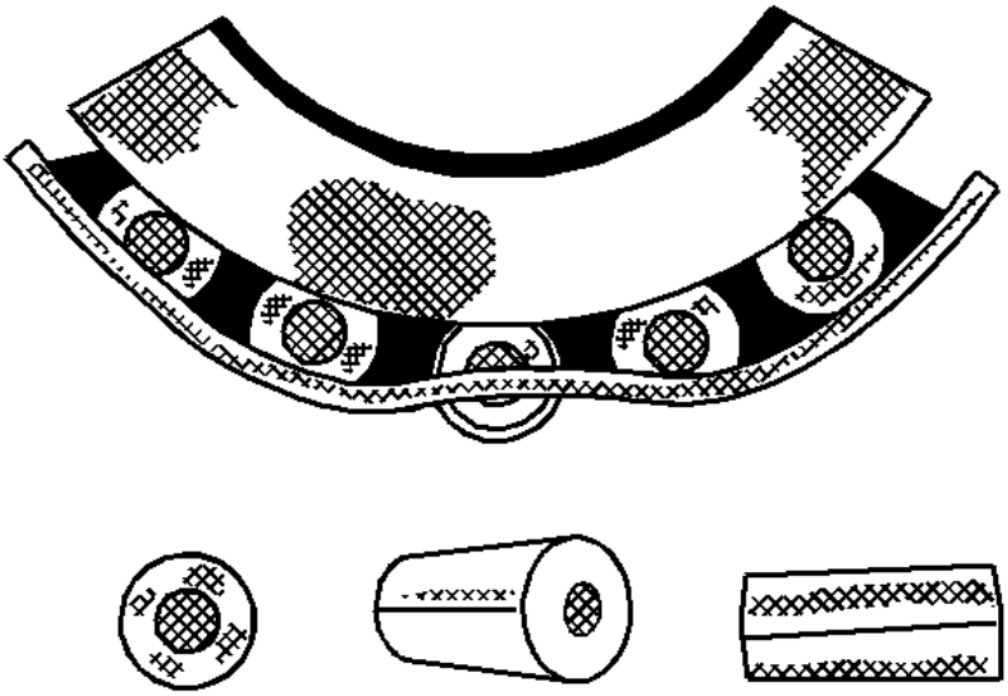


Fig. 19: Identifying Bent Roller Cage
Courtesy of GENERAL MOTORS CORP.

A damaged cage due to improper handling or improper tool usage. Replace the bearing.

Cage Wear

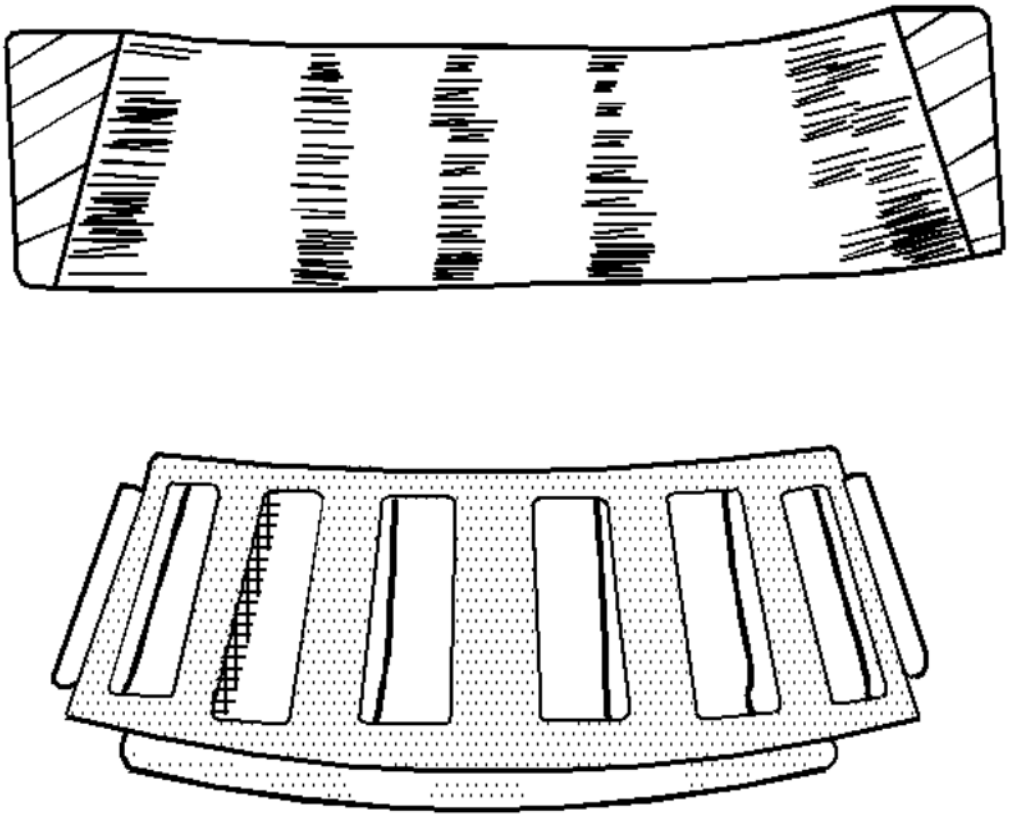


Fig. 20: Identifying Cage Wear
Courtesy of GENERAL MOTORS CORP.

Wear around the outside diameter of the cage and the roller pockets caused by abrasive material. Wear caused from inefficient lubrication. Clean the related parts and the housings. Check the seals. Replace the bearings.

Indentations

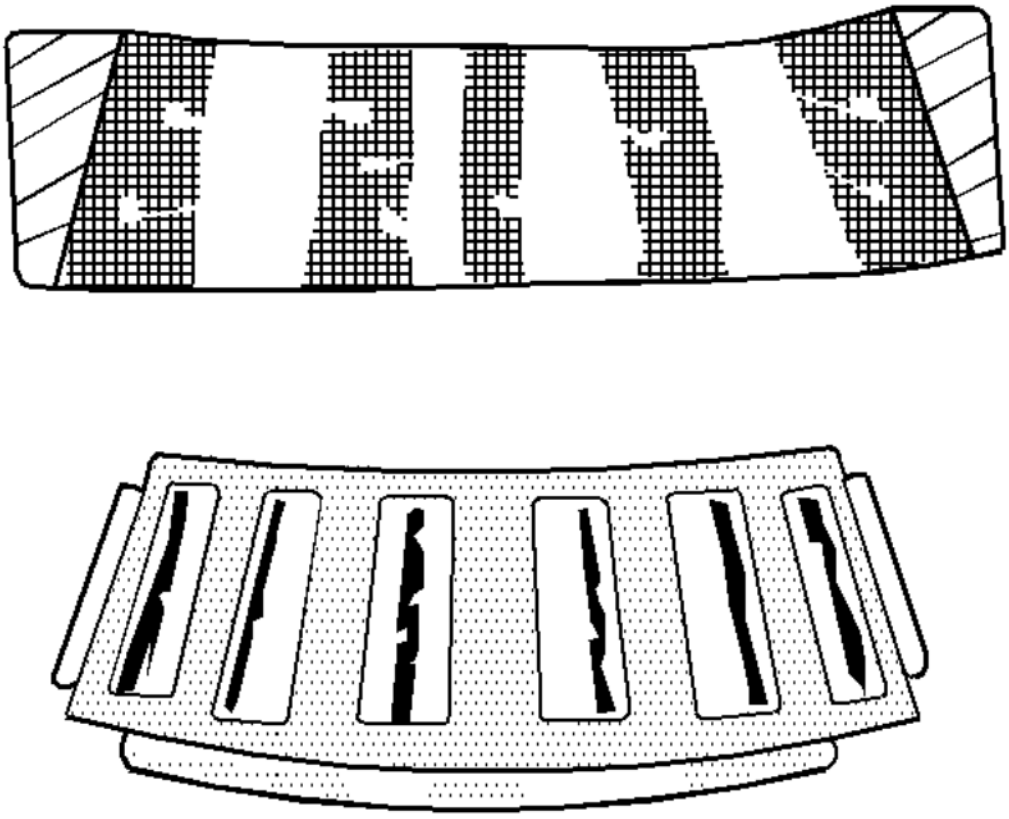


Fig. 21: Identifying Surface Indentations
Courtesy of GENERAL MOTORS CORP.

Surface depressions on the race and the rollers caused by hard particles of foreign matter. Clean all the parts and the housings. Check the seals. Replace rough or noisy bearings.

Frettage

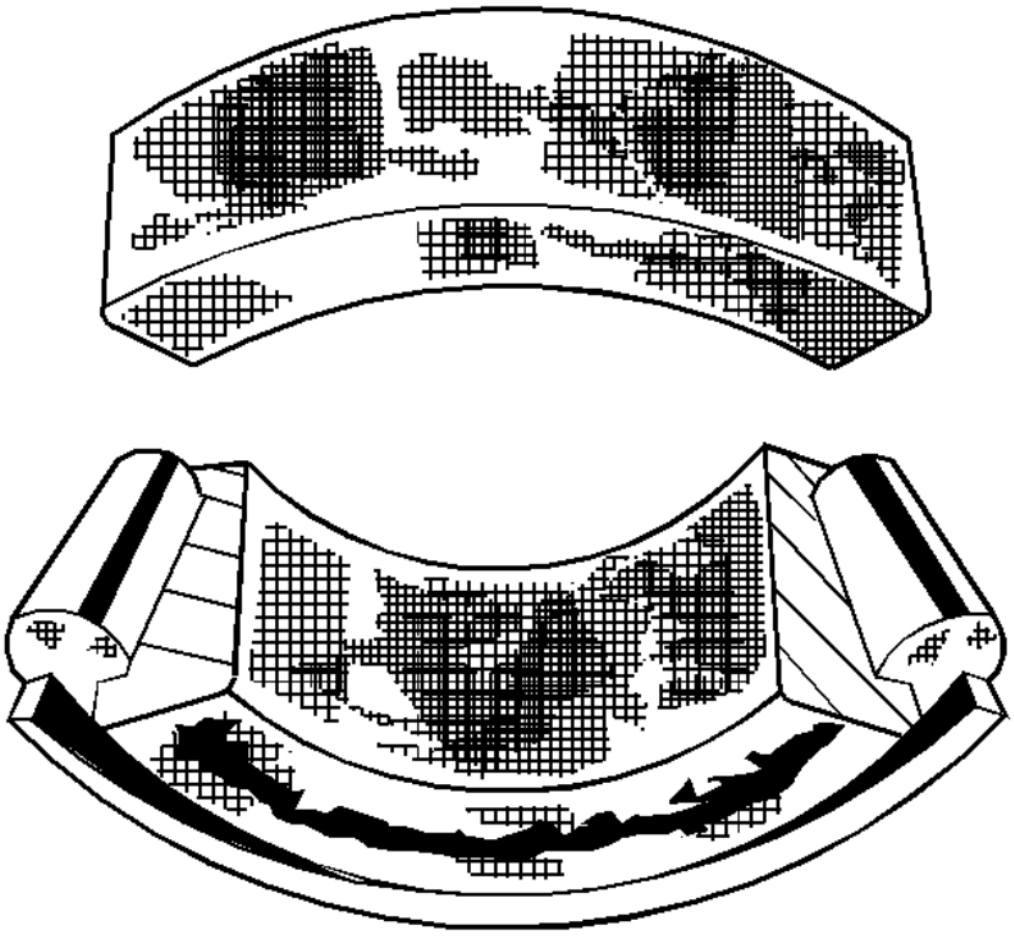


Fig. 22: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

Corrosion caused by small relative movement of parts with no lubrication. Replace the bearing. Clean the related parts. Check the seals. Check for proper lubrication.

Smears

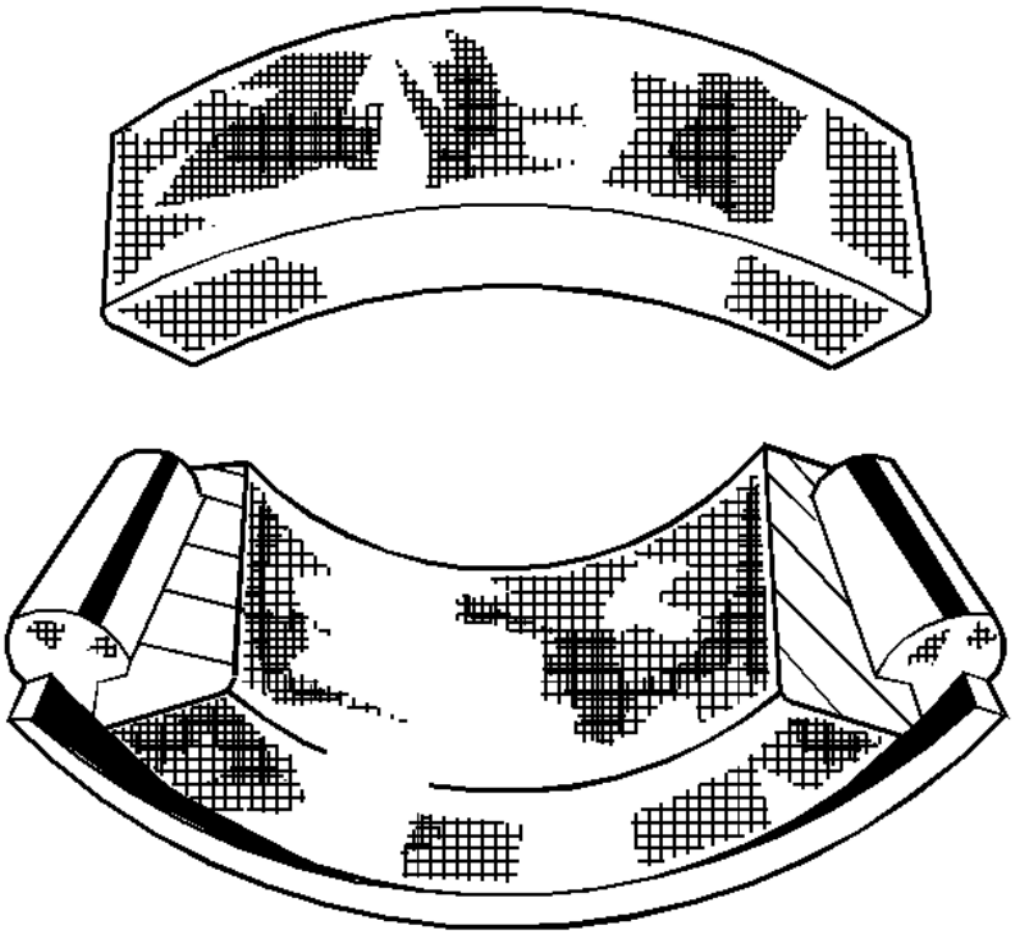


Fig. 23: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

Smearing of the metal due to slippage. Slippage can be caused by the following factors:

- Poor fits
- Lubrication
- Overheating
- Overloads
- Handling damage

Replace the bearings. Clean the related parts. Check for proper fit and lubrication.

Stain Discoloration

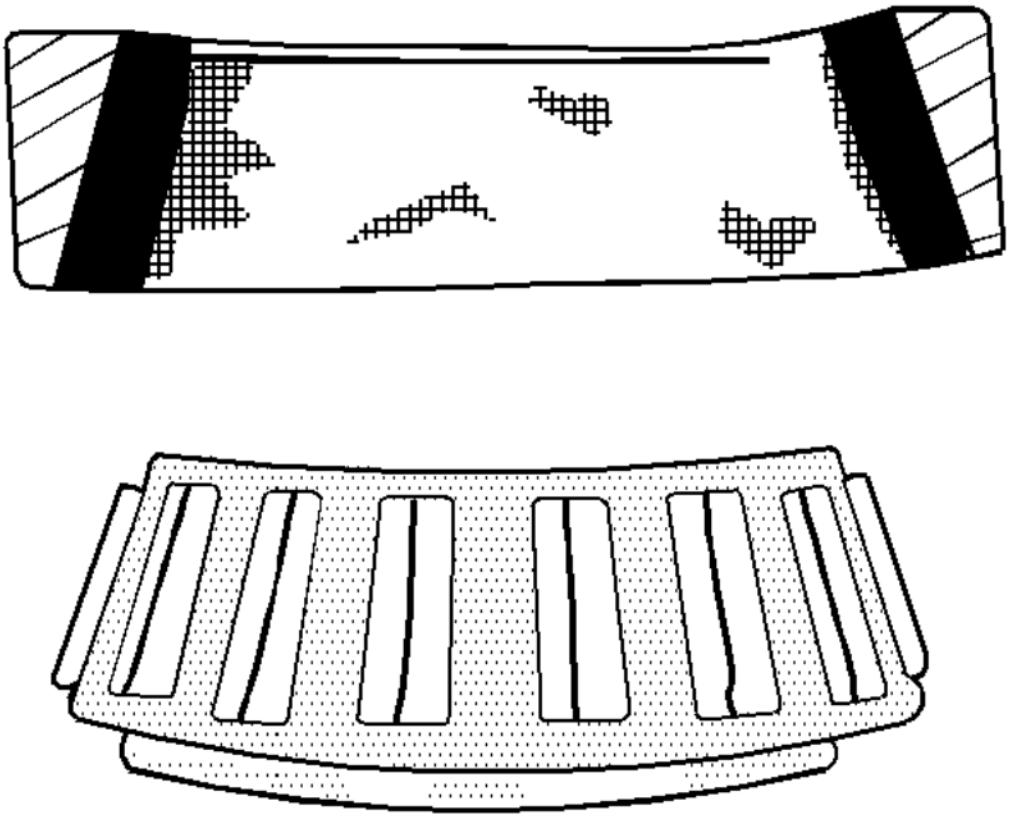


Fig. 24: Identifying Stain Discoloration
Courtesy of GENERAL MOTORS CORP.

Discoloration ranging from light brown to black. This discoloration is caused from incorrect lubrication or moisture. Reuse the bearing if you can remove the stains with light polishing. Reuse the bearing if there is no evidence of overheating. Check the seals and the related parts for damage.

Heat Discoloration

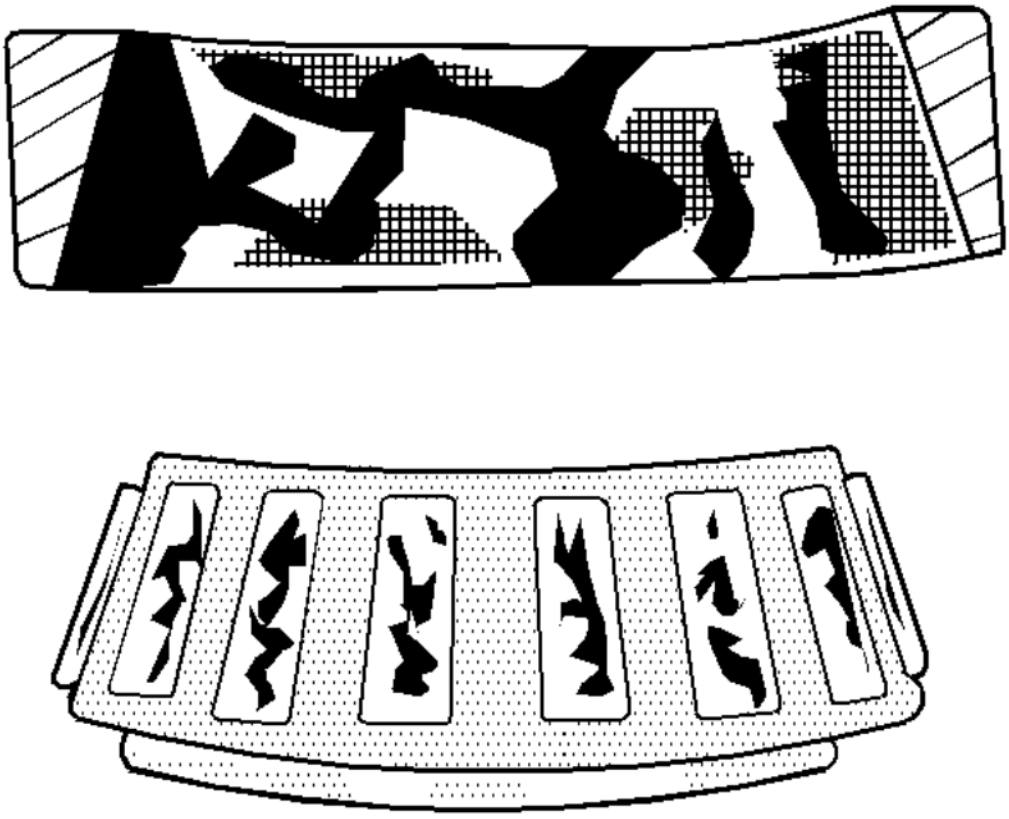


Fig. 25: Identifying Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

Heat discoloration ranges from faint yellow to dark blue. This discoloration results from overload or an incorrect lubricant. Excessive heat causes softening of the races or the rollers. In order to check for loss of temper on the races and the rollers, perform a file test. A file drawn over a tempered part will grab and cut the metal. A file drawn over a hard part will glide readily with no metal cutting. Replace the bearings if overheating damage is indicated. The tempered part will fail the file test. Check the seals and the other related parts.

Misalignment

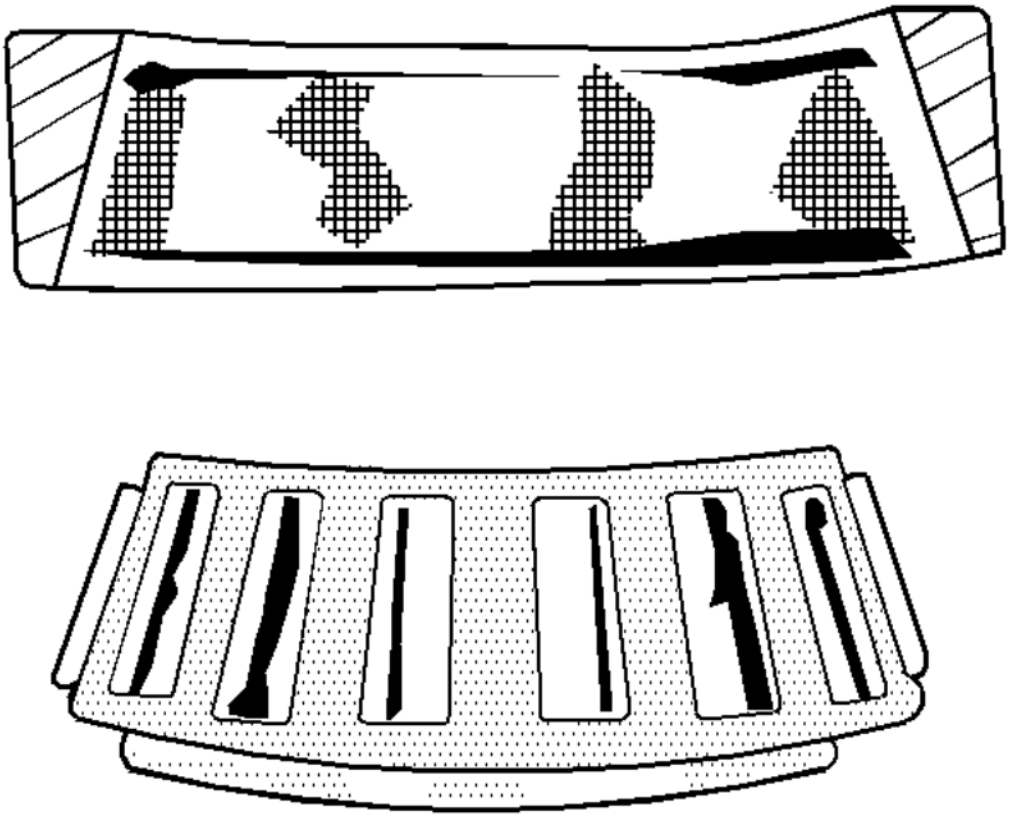


Fig. 26: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

A misaligned outer race due to a foreign object. Clean the related parts. Replace the bearing. Ensure the races are properly sealed.

Cracked Inner Race

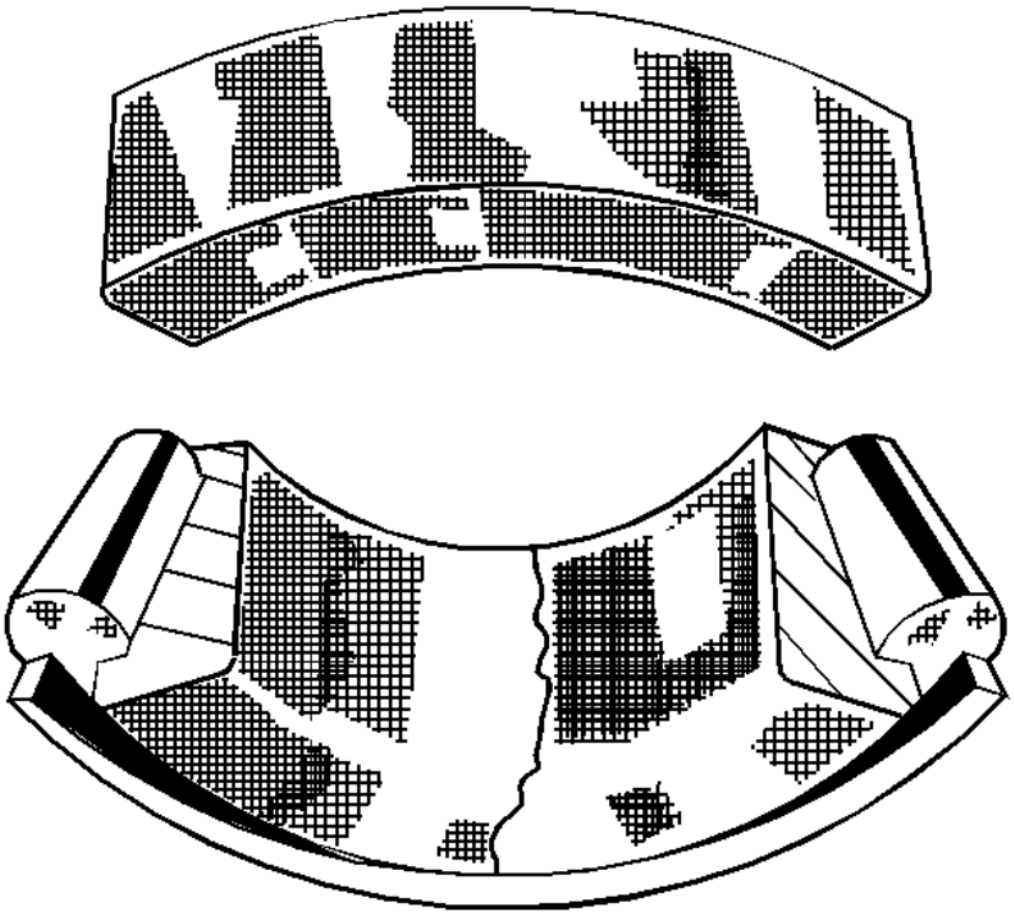


Fig. 27: Identifying Cracked Inner Race
Courtesy of GENERAL MOTORS CORP.

Cracked race due to improper fit, cocking, or poor bearing seats. Replace the bearing. Correct bearing seats.

Fatigue Spalling

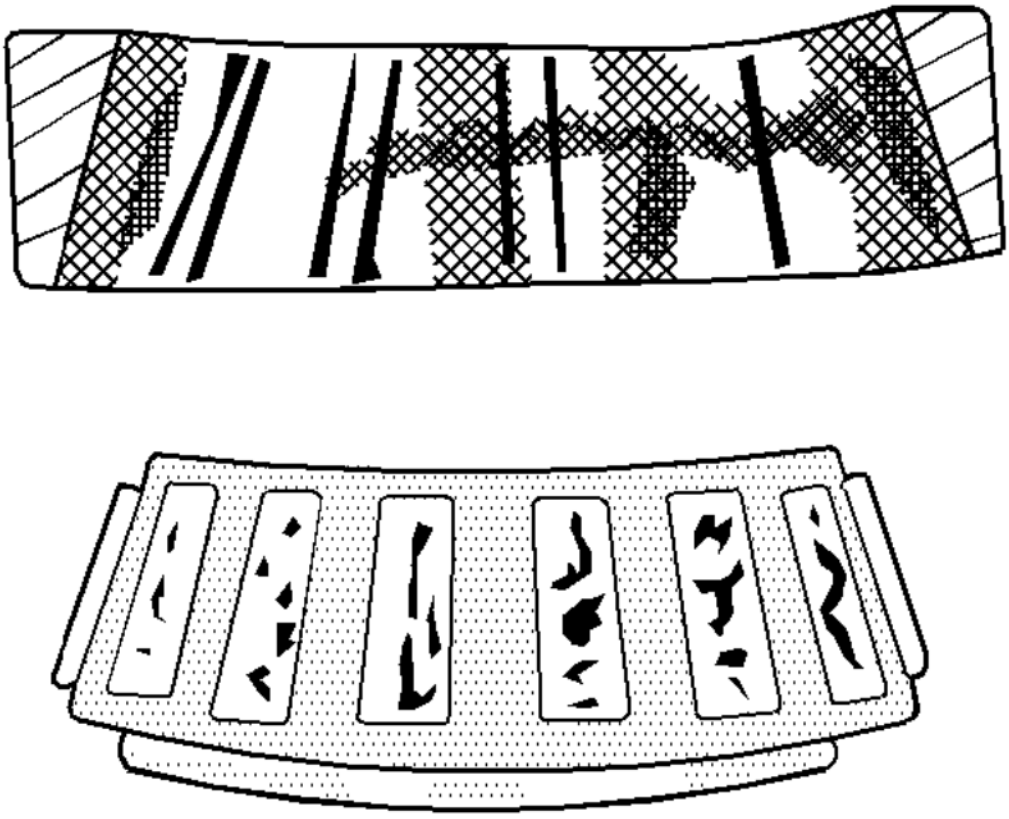


Fig. 28: Identifying Fatigue Spalling
Courtesy of GENERAL MOTORS CORP.

Flaked surface metal that results from fatigue. Replace the bearing. Clean all related parts.

Brinelling

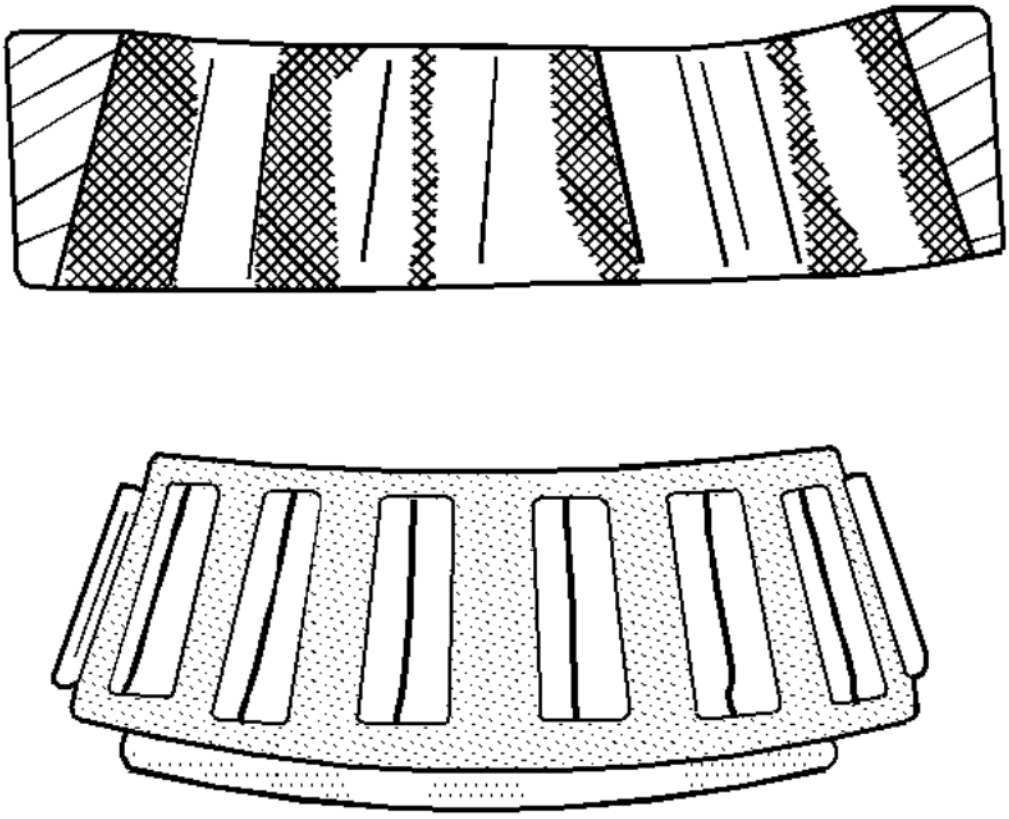


Fig. 29: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

Surface indentations in the race way caused by the rollers under impact loading or caused from vibration while the bearing is not rotating. Replace a rough or noisy bearing.

REAR AXLE LUBRICANT LEAK DIAGNOSIS

Rear axle lubricant leaks can occur at the following locations:

- Axle tube to differential carrier housing joint
- Axle shaft oil seal
- Axle housing porosity
- Differential housing cover gasket

- Drain plug
- Fill plug
- Pinion yoke oil seal
- Vent tube

Determining the Cause

While most rear axle leaks may be easy to find, determining the cause may not be. A thorough inspection of the area around the leak may assist in determining the cause of the leak.

Oil Seals

Lubricant leaks from a oil seal may be caused by any of the following:

- An improperly installed seal
- A distorted seal
- A worn seal
- A worn shaft
- A brittle seal lip
- A hardened seal lip

To determine the actual cause of the leak, clean the area around the leak. Observe the area of the leak and determine the if the seal or another component is causing the leak. A worn seal surface will cause a leak at the sealing lip while a misaligned seal or a seal installed into a housing with an excessive bore will cause the seal to leak at the outside surface of the seal. Hardened or cracked seal lips usually indicate the axle is operating beyond the normal temperature limits for the axle. A seal whose sealing surface has been nicked or cut may indicate that the shaft has a rough, burred, or gouged surface and will need to be inspected before the seal can be replaced.

Gaskets

A leak at a gasket is usually caused by a poor fit of the components on each side of the gasket surface. Inspect each component for distortion and for nicks or gouges that may prohibit the gasket from sealing properly.

Rear Axle Housing

Rear axle housing lubricant leaks usually occur at the following locations:

- Drain Plug

- Fill Plug

Drain and fill plug leaks are usually caused by a loose plug. These leaks can by repaired by either tightening the plug or by using an approved sealer on the threads on the plug.

Other leaks such as axle tube to differential carrier housing or porosity leaks require the replacement of the rear axle housing.

LIMITED SLIP DIFFERENTIAL DIAGNOSIS

Limited Slip Differential Diagnosis

Step	Action	Values	Yes	No
1	Did you review the general description and perform the necessary inspections?	-	Go to **Step 2**	Go to **Diagnostic Starting Point - Locking/Limited Slip Rear Axle**
2	Measure the rotational force of the axle using the following procedure: 1. Block the front wheels. 2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 3. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** . 4. Using the **J 28733-B** Front/Rear Spindle Remover, measure the rotational force of the axle. See **Special Tools**. 5. Repeat the procedure for the other axle. Does the force measure outside the specified range?	22-271 N.m (30-200 lb ft)	Go to **Step 3**	System OK
3	Repair the rear axle. Did you complete the repair?	-	Go to **Step 4**	-

4	Operate the system in order to verify the repair. Did you correct the condition?	-	Go to **Step 2**	System OK

LOCKING DIFFERENTIAL DIAGNOSIS

1. Place the vehicle on a frame-contact hoist, allowing free rotation of the rear wheels.
2. Hold 1 wheel stationary. Slowly rotate the other wheel approximately 1/2 revolution per second in both the forward and reversed directions. The wheel should rotate freely. The differential is locking and is broken if both wheels attempt to turn together.
3. Raise the hoist to maximum height with 1 person in the vehicle.
4. Start the engine. Ensure that the engine is operating at low idle speed (warm engine).
5. Apply the service brake. Place the automatic transmission in drive. Depress the clutch and place the transmission in first gear with a manual transmission.
6. Lock 1 rear wheel by pulling one parking brake cable from under the vehicle with the aid of an assistant.
7. Release the service brakes or disengage the clutch slowly enough to start the free wheel turning. The locked rear wheel remains stationary.
8. Increase the speed of the free wheel. The differential will lock, causing the rotating wheel to stop or both wheels to turn at the same speed. The engine, if equipped with manual transmission, may stall. In order to cause the differential to lock, you may need to accelerate the engine until approximately 16 km/h (10 mph) is indicated on the vehicle speedometer. If the indicated speed can be increased beyond 32 km/h (20 mph) without causing the differential to lock, the unit is not functioning properly. Rapid release of the brakes or clutch, or rapid acceleration of the engine, will invalidate the test.
9. Lock the opposite rear wheel and repeat the procedure.

LOCKING REAR AXLE DOES NOT LOCK

Checks	Action
Little or no preload on the latching bracket	Replace the governor assembly and the latching bracket. Refer to **Locking Differential Disassemble (8.6, 9.5LD Axles)** and **Locking Differential Cam Unit Disassemble (9.5 Inch Axle)**.
Flyweights in the governor assembly are stuck closed	Replace the governor assembly and the latching bracket. Refer to **Locking Differential Assemble (9.5 Inch Axle)** and **Locking Differential Assemble (9.5 Inch Axle)**.
The drive teeth on the	Replace the cam plate, the governor assembly, and the latching

governor or cam gear assembly are broken	bracket. Refer to the following: • **Locking Differential Disassemble (8.6, 9.5LD Axles)** • **Locking Differential Cam Unit Disassemble (9.5 Inch Axle)** • **Locking Differential Cleaning and Inspection** • **Locking Differential Cam Unit Assemble (8.6 Inch Axle)** or **Locking Differential Cam Unit Assemble (9.5 Inch Axle)** • **Locking Differential Adjustment (8.6 Inch Axle)** or **Locking Differential Adjustment (9.5 Inch Axle)** • **Locking Differential Assemble (9.5 Inch Axle)**
Broken clutch plates	Replace the clutch plates and the wave spring. Refer to the following: • **Locking Differential Disassemble (8.6, 9.5LD Axles)** • **Locking Differential Cam Unit Disassemble (9.5 Inch Axle)** • **Locking Differential Cleaning and Inspection** • **Locking Differential Cam Unit Assemble (8.6 Inch Axle)** or **Locking Differential Cam Unit Assemble (9.5 Inch Axle)** • **Locking Differential Adjustment (8.6 Inch Axle)** or **Locking Differential Adjustment (9.5 Inch Axle)** • **Locking Differential Assemble (9.5 Inch Axle)**

LOCKING REAR AXLE LOCKS IN TURNS

Checks	Action
The governor assembly is tight in the case	Free up the governor assembly. Refer to **Locking Differential Disassemble (8.6, 9.5LD Axles)** and **Locking Differential Assemble (9.5 Inch Axle)**.
Broken or weak governor flyweight spring	Replace the governor assembly and the latching bracket. Refer to **Locking Differential Disassemble (8.6, 9.5LD Axles)** and **Locking Differential Assemble (9.5 Inch Axle)**.
The flyweight in the	Replace the governor assembly and the latching bracket. Refer

governor assembly is stuck open	to **Locking Differential Disassemble (8.6, 9.5LD Axles)** and **Locking Differential Assemble (9.5 Inch Axle)**.
The cam plate or the governor drive teeth are broken	Replace the cam plate, the governor assembly, and the latching bracket. Refer to the following: • **Locking Differential Disassemble (8.6, 9.5LD Axles)** • **Locking Differential Cam Unit Disassemble (9.5 Inch Axle)** • **Locking Differential Cleaning and Inspection** • **Locking Differential Cam Unit Assemble (8.6 Inch Axle)** or **Locking Differential Cam Unit Assemble (9.5 Inch Axle)** • **Locking Differential Adjustment (8.6 Inch Axle)** or **Locking Differential Adjustment (9.5 Inch Axle)** • **Locking Differential Assemble (9.5 Inch Axle)**

LOCKING REAR DRIVE AXLE CHATTERS IN TURNS

Checks	Action
Lubricant is contaminated	Drain and flush the axle housing thoroughly. Refill with the correct lubricant. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
The clutch plates are deteriorated	Replace the clutch plates. Refer to **Locking Differential Cam Unit Disassemble (9.5 Inch Axle)** and **Symptoms - Locking/Limited Slip Rear Axle**.

NOISE IN ADDITION TO NORMAL CLUTCH ENGAGEMENT

Checks	Action
The clutch plates are broken	Replace the clutch plates. Refer to the following: • **Locking Differential Disassemble (8.6, 9.5LD Axles)** • **Locking Differential Cam Unit Disassemble (9.5 Inch Axle)** • **Locking Differential Cleaning and Inspection**

	• **Locking Differential Cam Unit Assemble (8.6 Inch Axle)** or **Locking Differential Cam Unit Assemble (9.5 Inch Axle)** • **Locking Differential Adjustment (8.6 Inch Axle)** or **Locking Differential Adjustment (9.5 Inch Axle)** • **Locking Differential Assemble (9.5 Inch Axle)**
The thrust block is broken	Replace the thrust block with a block of identical thickness. Check closely for other damage. Refer to **Locking Differential Disassemble (8.6, 9.5LD Axles)** and **Locking Differential Assemble (9.5 Inch Axle)**.
The case is damaged	Replace the unit. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.
The differential gears are broken	Replace the gears. Refer to the following: • **Locking Differential Disassemble (8.6, 9.5LD Axles)** • **Locking Differential Cam Unit Disassemble (9.5 Inch Axle)** • **Locking Differential Cleaning and Inspection** • **Locking Differential Cam Unit Assemble (8.6 Inch Axle)** or **Locking Differential Cam Unit Assemble (9.5 Inch Axle)** • **Locking Differential Adjustment (8.6 Inch Axle)** or **Locking Differential Adjustment (9.5 Inch Axle)** • **Locking Differential Assemble (9.5 Inch Axle)**

REPAIR INSTRUCTIONS

REAR AXLE LUBRICANT LEVEL INSPECTION (11.5 INCH AXLE)

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Make sure the vehicle is level.
3. Inspect the rear axle for leaks. Repair as necessary.
4. Clean the area around the rear axle fill plug.

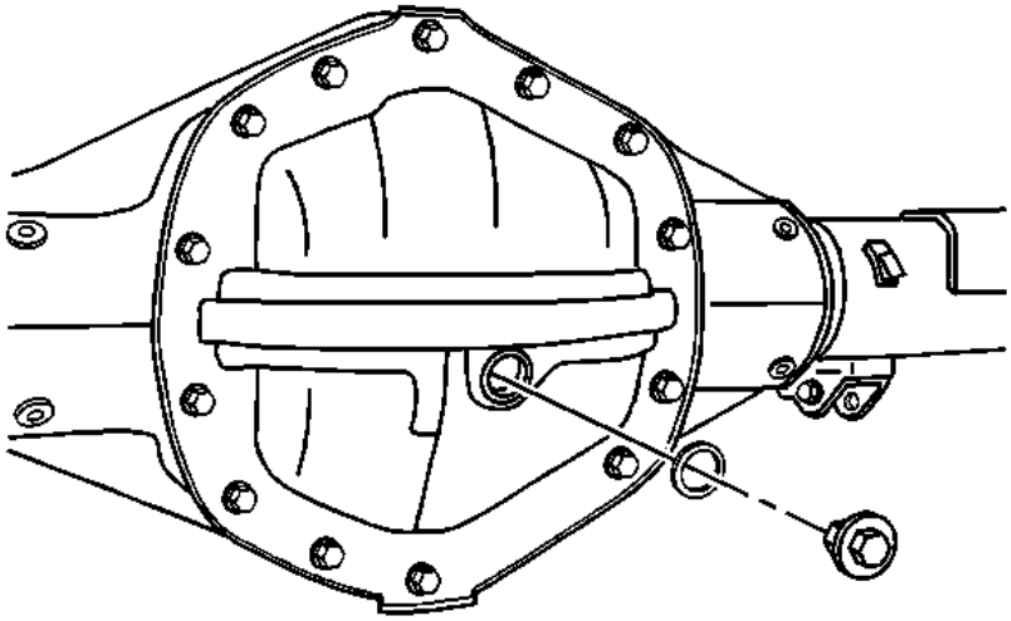


Fig. 30: Identifying Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

5. Remove the rear axle fill plug and the seal.
6. Inspect the lubricant level.

   Specification: The lubricant level should be between 17-21 mm (0.6-0.8 in) below the fill plug opening.

7. If the level is low, add lubricant until the level is between 17-21 mm (0.6-0.8 in) below the fill plug opening. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

   NOTE: Refer to Fastener Notice .

8. Install the rear axle fill plug and gasket.

   Tighten: Tighten the rear axle fill plug to 33 N.m (24 lb ft).

9. Lower the vehicle.

REAR AXLE LUBRICANT LEVEL INSPECTION (8.6, 9.5 LD AXLE)

IMPORTANT: All axle assemblies are filled by volume of fluid during production. They are not filled to reach a certain level. When checking the fluid level on any axle, variations in the readings can be caused by factory fill differences between the minimum and the maximum fluid volume. Also, if a vehicle has just been driven before checking the fluid level, it may appear lower than normal because the fluid has traveled out along the axle tubes and has not drained back to the sump area. Therefore, a reading taken five minutes after the vehicle has been driven will appear to have a lower fluid level than a vehicle that has been stationary for an hour or two. Remember that the rear axle assembly must be supported to get a true reading.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Ensure the vehicle is level.
3. Inspect the rear axle for leaks. Repair as necessary.
4. Clean the area around the rear axle fill plug.

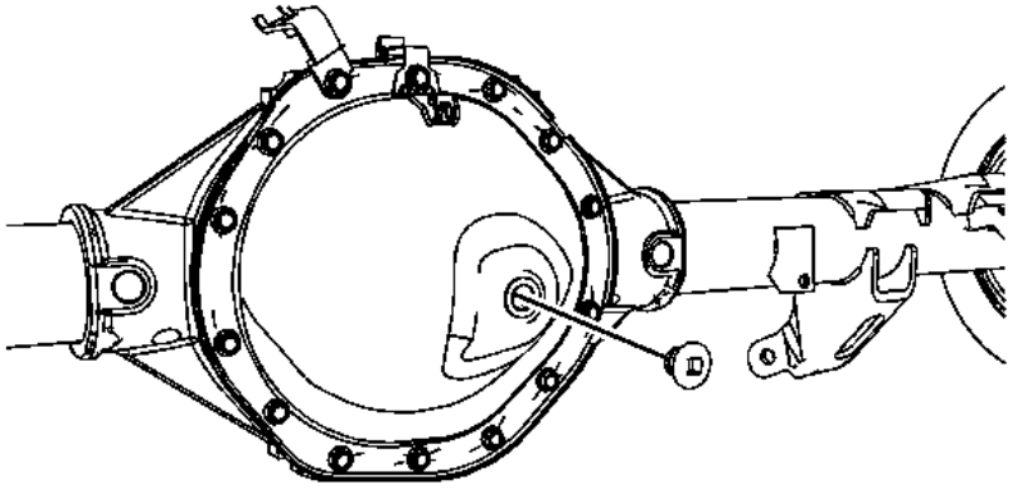


Fig. 31: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

5. Remove the rear axle fill plug.
6. Inspect the lubricant level:
   - **Specification:** The lubricant level should be between 1-19 mm (0.04-0.75 in) below the fill plug opening for the 8.6 inch axle.
   - **Specification:** The lubricant level should be between 15-40 mm (0.59-1.57 in) below the fill plug opening for the 9.5 inch LD axle.
7. If the level is low, add lubricant until the level is even with the bottom edge of the fill plug opening. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

   NOTE: Refer to Fastener Notice .

8. Install the rear axle fill plug.

   Tighten: Tighten the rear axle fill plug to 33 N.m (24 lb ft).

9. Lower the vehicle.

REAR AXLE LUBRICANT LEVEL INSPECTION (10.5 INCH AXLE)

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Make sure the vehicle is level.
3. Inspect the rear axle for leaks. Repair as necessary.
4. Clean the area around the rear axle fill plug.

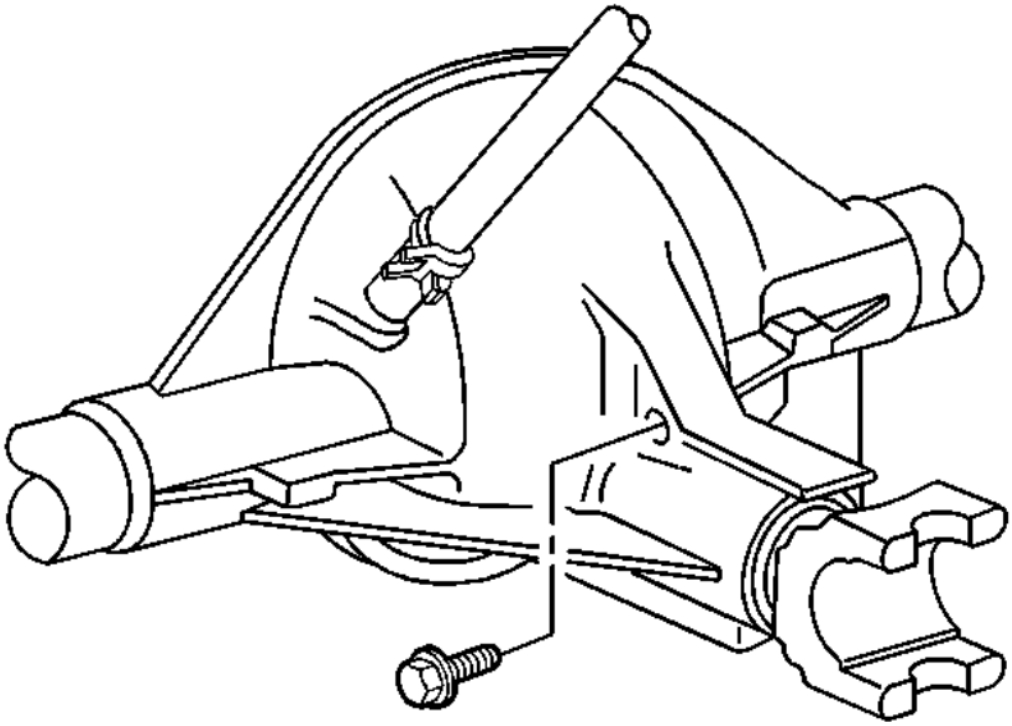


Fig. 32: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

5. Remove the rear axle fill plug.
6. Inspect the lubricant level.

Specification: The lubricant level should be between 0-10 mm (0-0.4 in) below the fill plug opening.

7. If the level is low, add lubricant until the level is even with the bottom edge of the fill plug opening. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

NOTE: Refer to Fastener Notice .

8. Install the rear axle fill plug.

   Tighten: Tighten the rear axle fill plug to 33 N.m (24 lb ft).

9. Lower the vehicle.

REAR AXLE LUBRICANT REPLACEMENT (8.6 INCH AXLE)

Removal Procedure

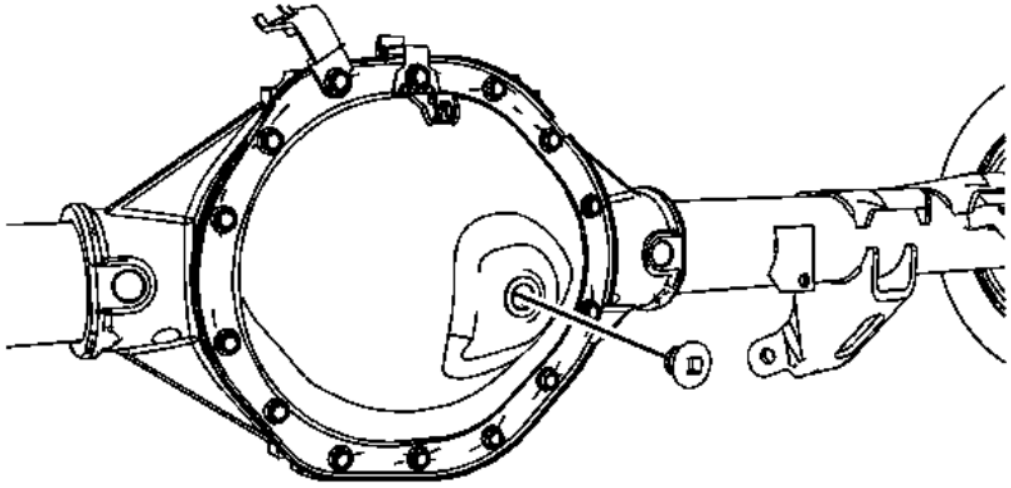


Fig. 33: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the fill plug.

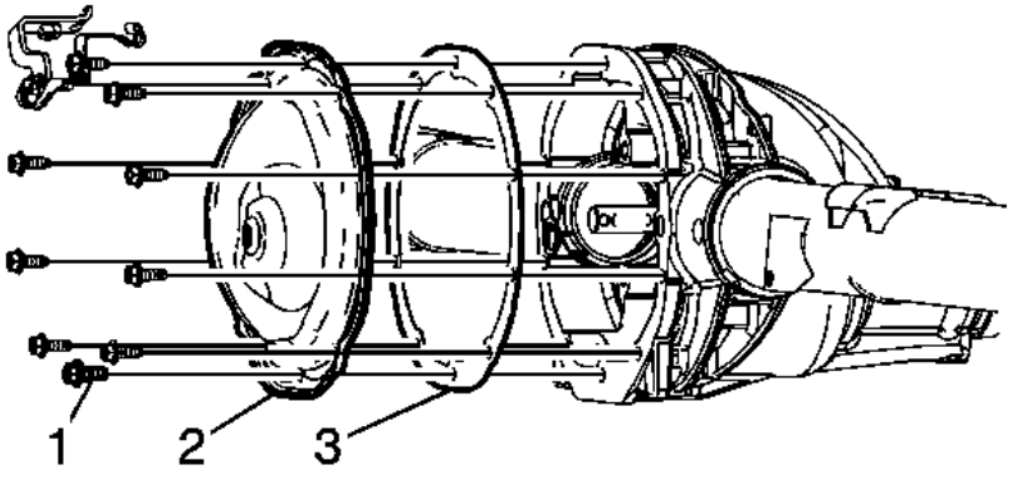


Fig. 34: View Of Rear Axle Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

3. Remove the rear axle housing cover. Refer to **Rear Axle Housing Cover and Gasket Replacement**.

Installation Procedure

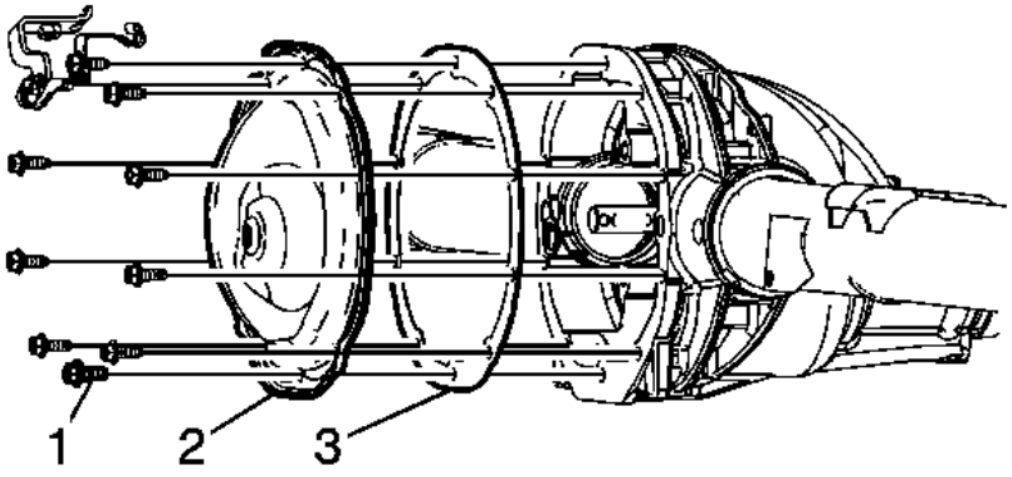


Fig. 35: View Of Rear Axle Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the rear axle housing cover. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
2. Fill the rear axle housing.
   - Use the proper fluid. Refer to **Approximate Fluid Capacities** .
   - For the correct capacity, refer to **Fluid and Lubricant Recommendations** .

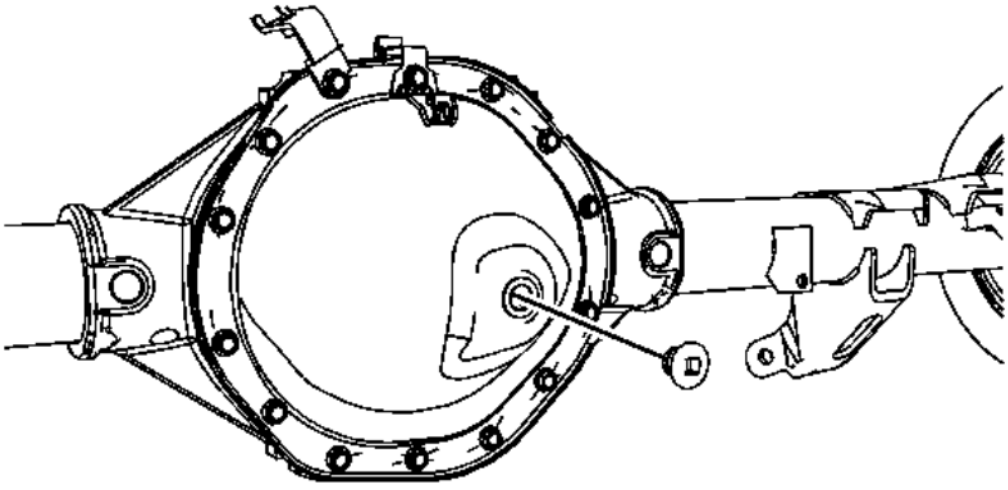


Fig. 36: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

3. Install the fill plug.

   Tighten: Tighten the fill plug to 33 N.m (24 lb ft).

REAR AXLE LUBRICANT REPLACEMENT (9.5 INCH LD AXLE)

Removal Procedure

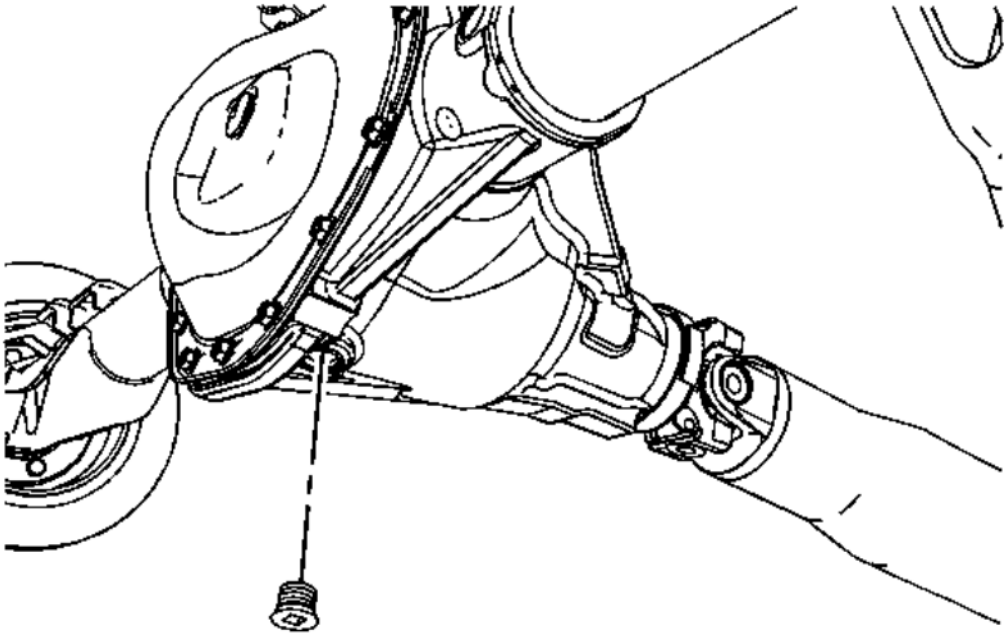


Fig. 37: View Of Drain Plug
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the drain plug.

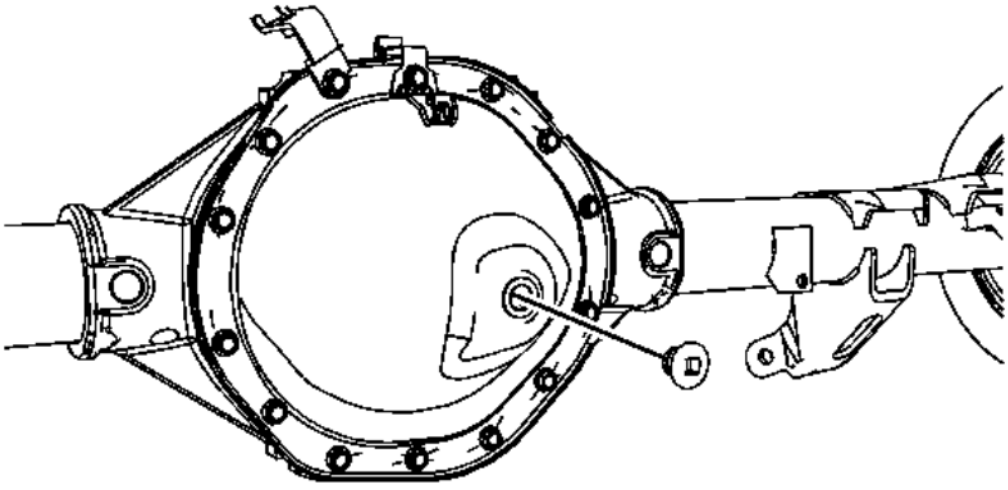


Fig. 38: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

3. Remove the fill plug.

Installation Procedure

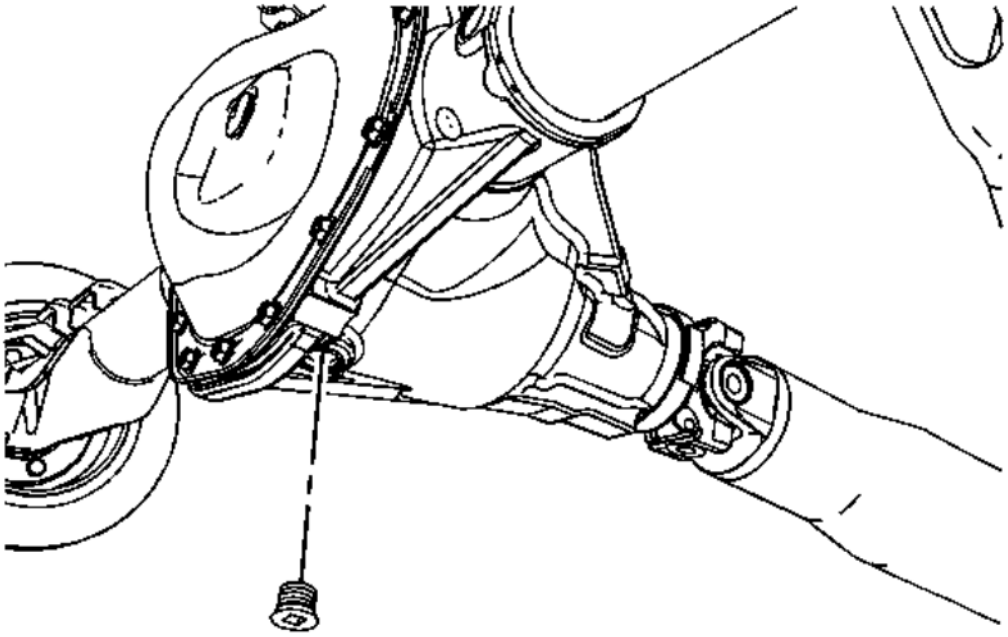


Fig. 39: View Of Drain Plug
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. Install the drain plug.

   Tighten: Tighten the drain plug to 33 N.m (24 lb ft).

2. Fill the rear drive axle.
   - Use the proper fluid, refer to **Approximate Fluid Capacities** .
   - For the proper capacity, refer to **Fluid and Lubricant Recommendations** .

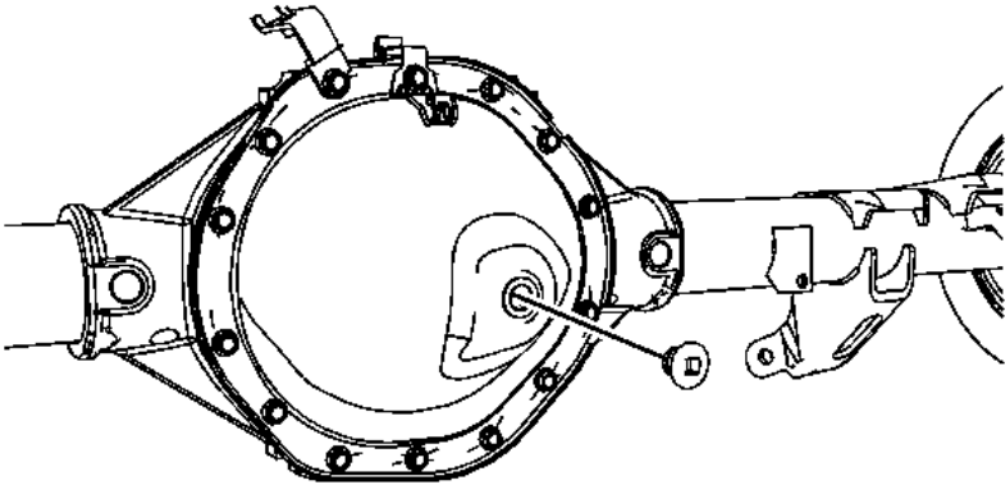


Fig. 40: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

3. Install the fill plug.

   Tighten: Tighten the fill plug to 33 N.m (24 lb ft).

4. Lower the vehicle.

REAR AXLE LUBRICANT REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

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

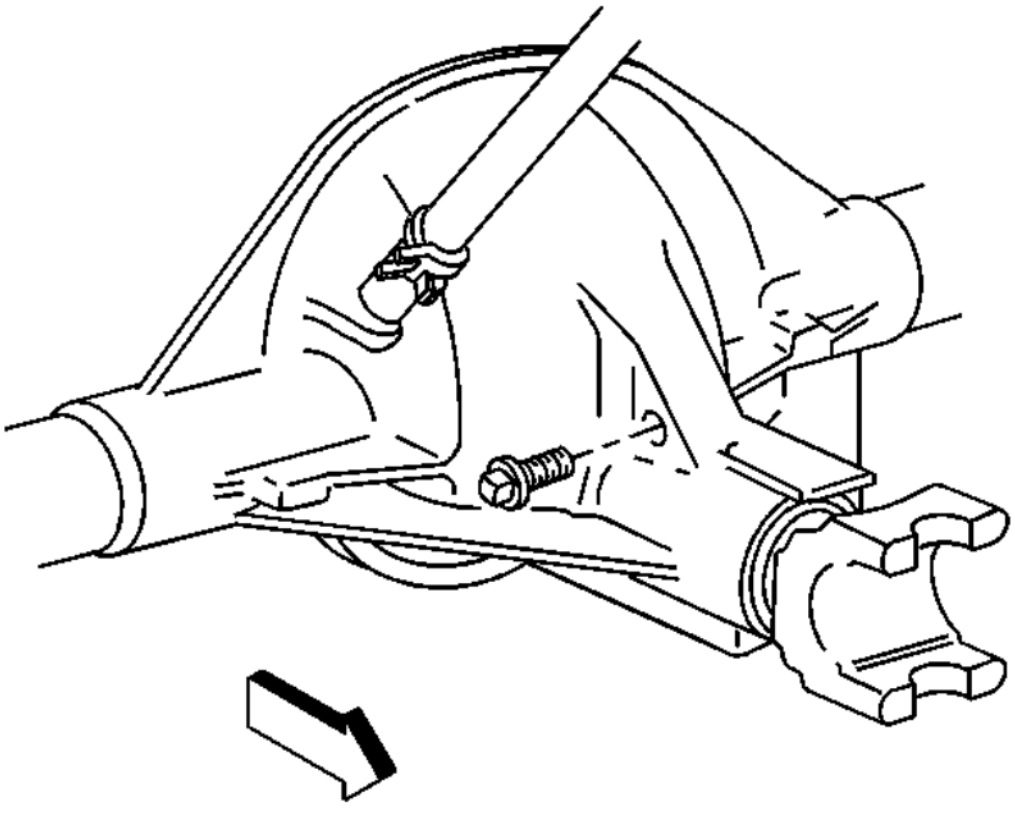


Fig. 41: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

2. Remove the rear axle fill plug.

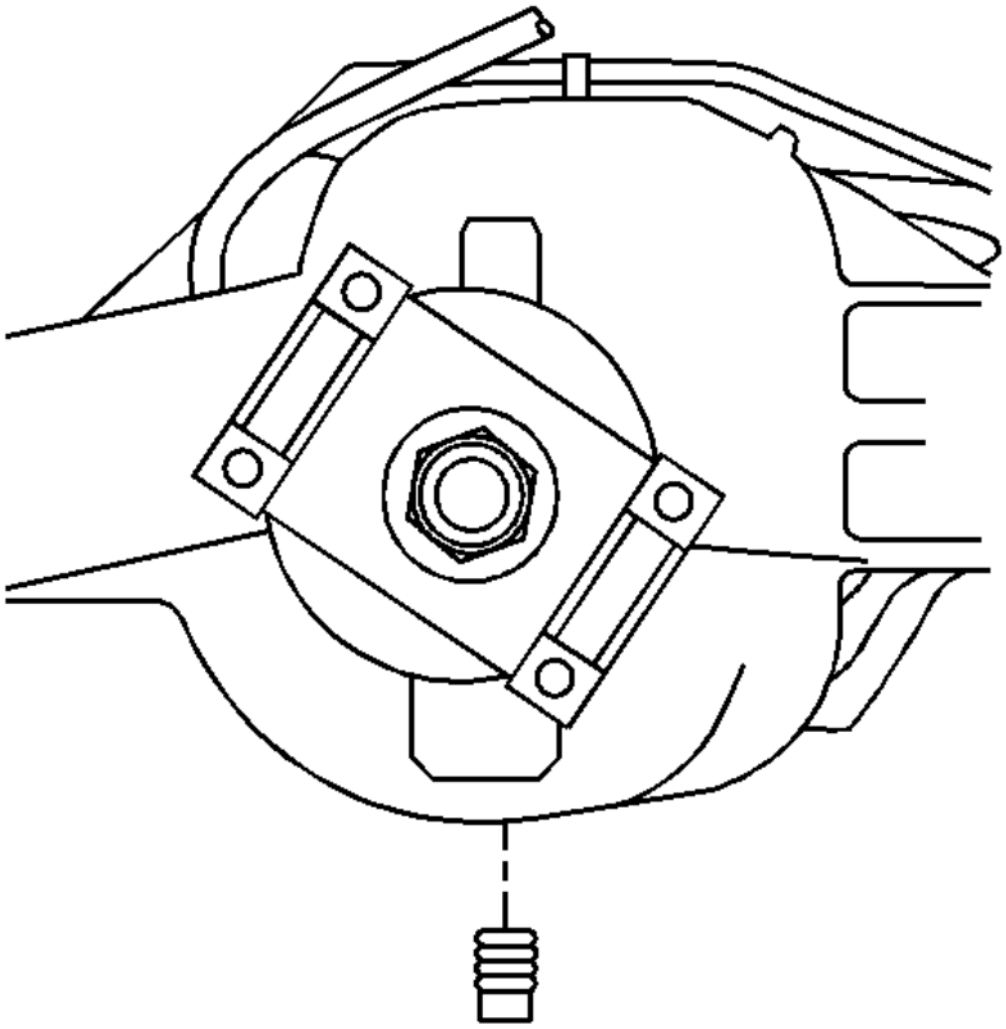


Fig. 42: Locating Rear Axle Drain Plug
Courtesy of GENERAL MOTORS CORP.

3. Remove the rear axle drain plug.
4. Drain the lubricant into a suitable container.
5. Inspect the drain plug for excessive metal particle accumulation. This accumulation is symptomatic of extreme wear.
6. Clean the drain plug.

Installation Procedure

NOTE: Refer to Fastener Notice .

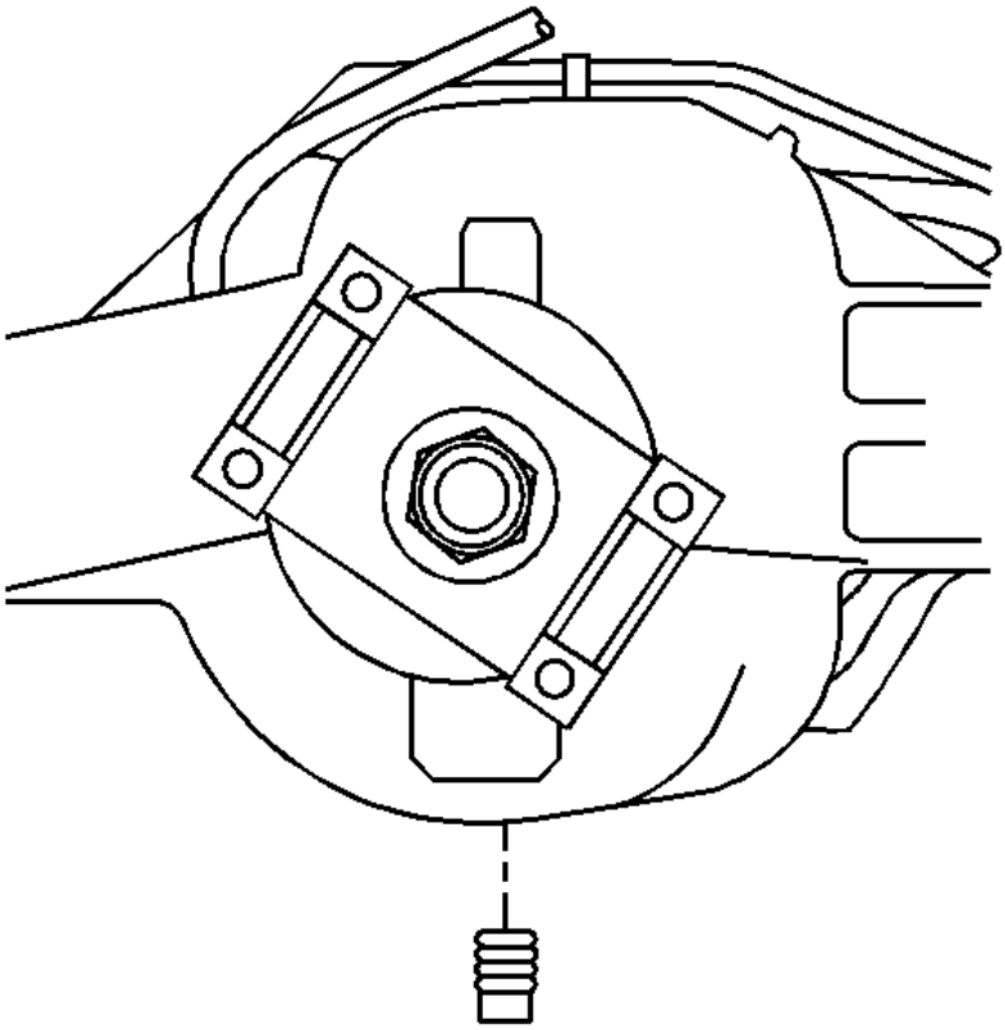


Fig. 43: Locating Rear Axle Drain Plug
Courtesy of GENERAL MOTORS CORP.

1. Install the rear axle drain plug.

   Tighten: Tighten the rear axle drain plug to 33 N.m (24 lb ft).

2. Fill the rear axle. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .

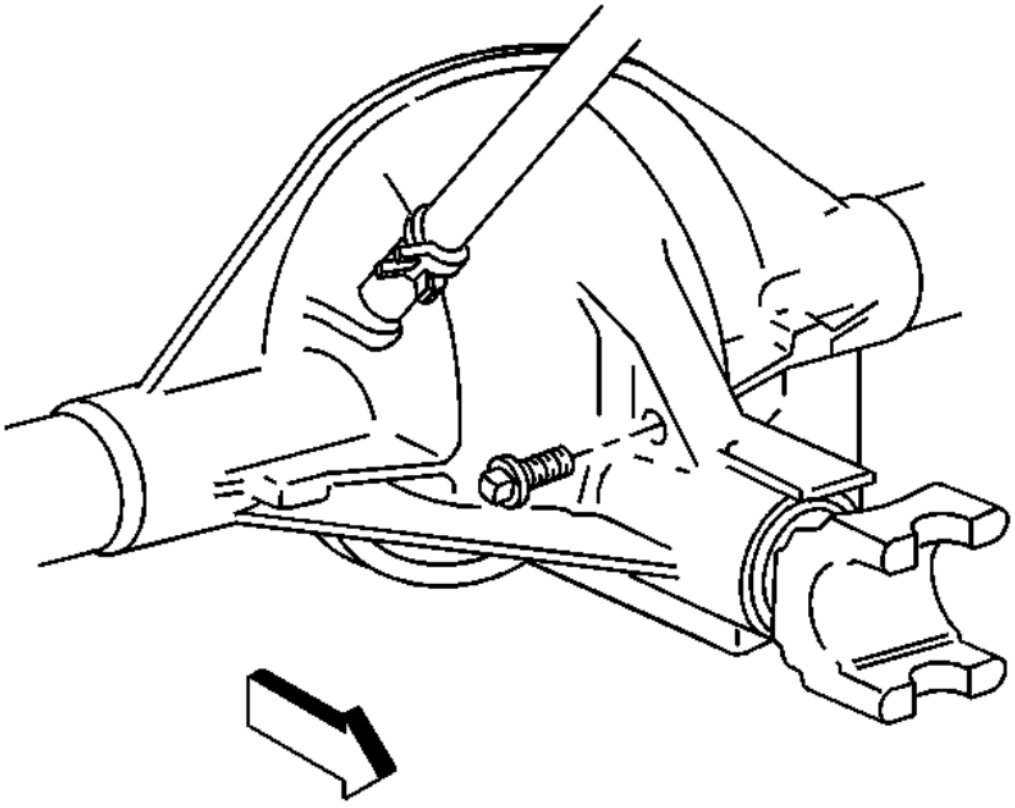


Fig. 44: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

3. Install the rear axle fill plug.

   Tighten: Tighten the rear axle fill plug to 33 N.m (24 lb ft).

4. Lower the vehicle.

VENT HOSE REPLACEMENT

Removal Procedure

IMPORTANT: Make note of the routing in order to aid in reassembly.

1. Raise and support the vehicle.

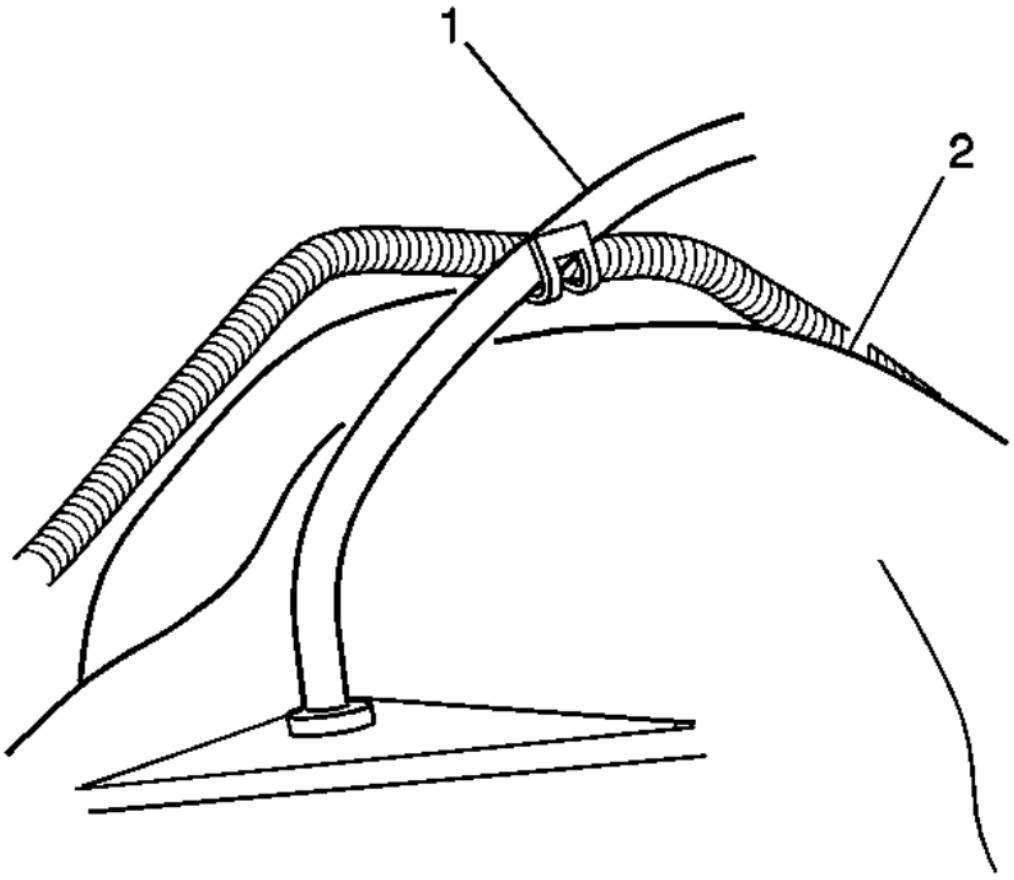


Fig. 45: Vent Hose & Rear Axle
Courtesy of GENERAL MOTORS CORP.

2. Remove the vent hose (1) from the top of the rear axle (2).

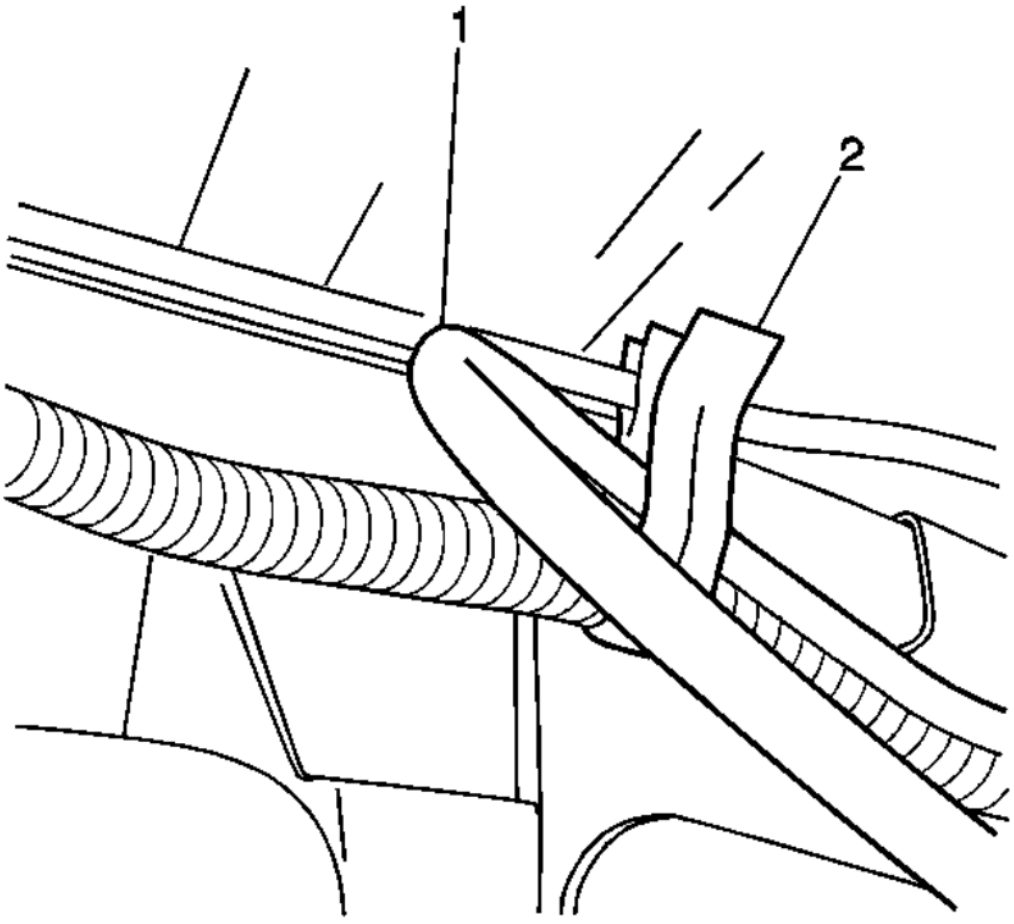


Fig. 46: Vent Hose & Frame Clip
Courtesy of GENERAL MOTORS CORP.

3. Remove the vent hose (1) from the clip (2) on the frame.

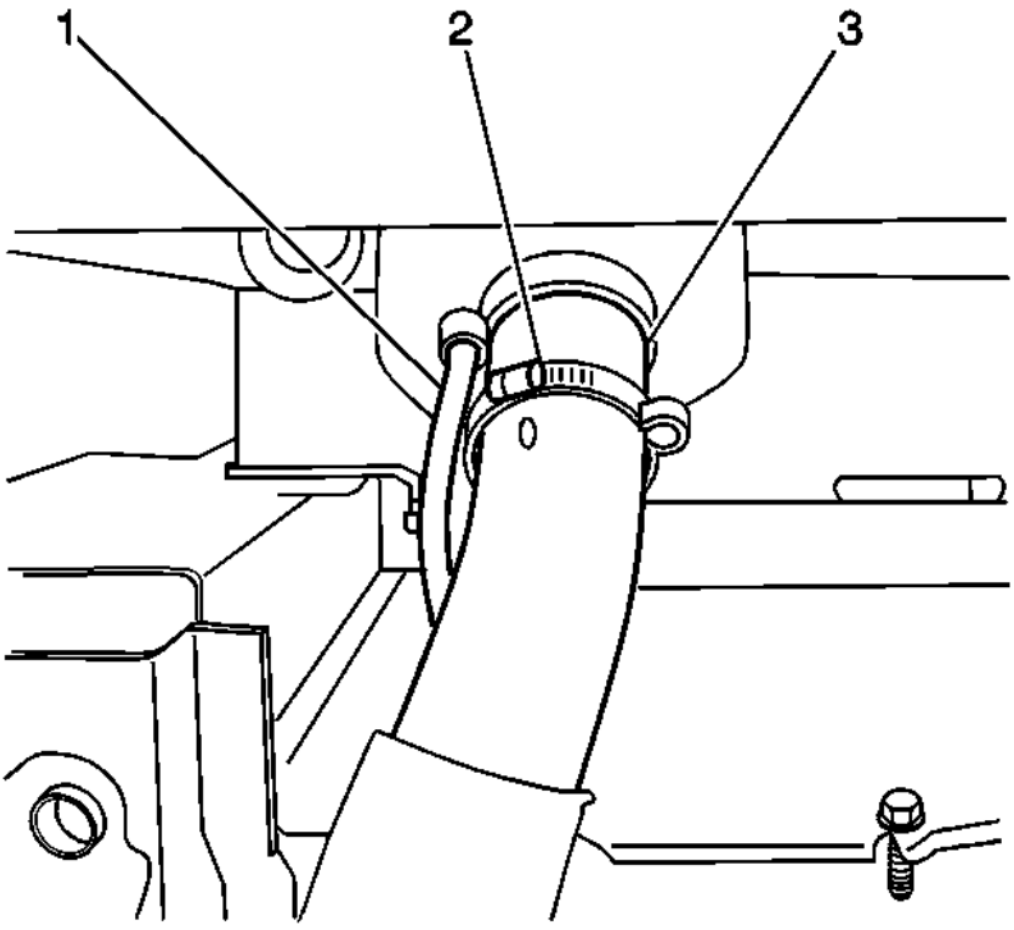


Fig. 47: Vent Hose & Filler Hose Clamp
Courtesy of GENERAL MOTORS CORP.

4. Remove the vent hose (1) from the clamp (2) on the filler hose.

Installation Procedure

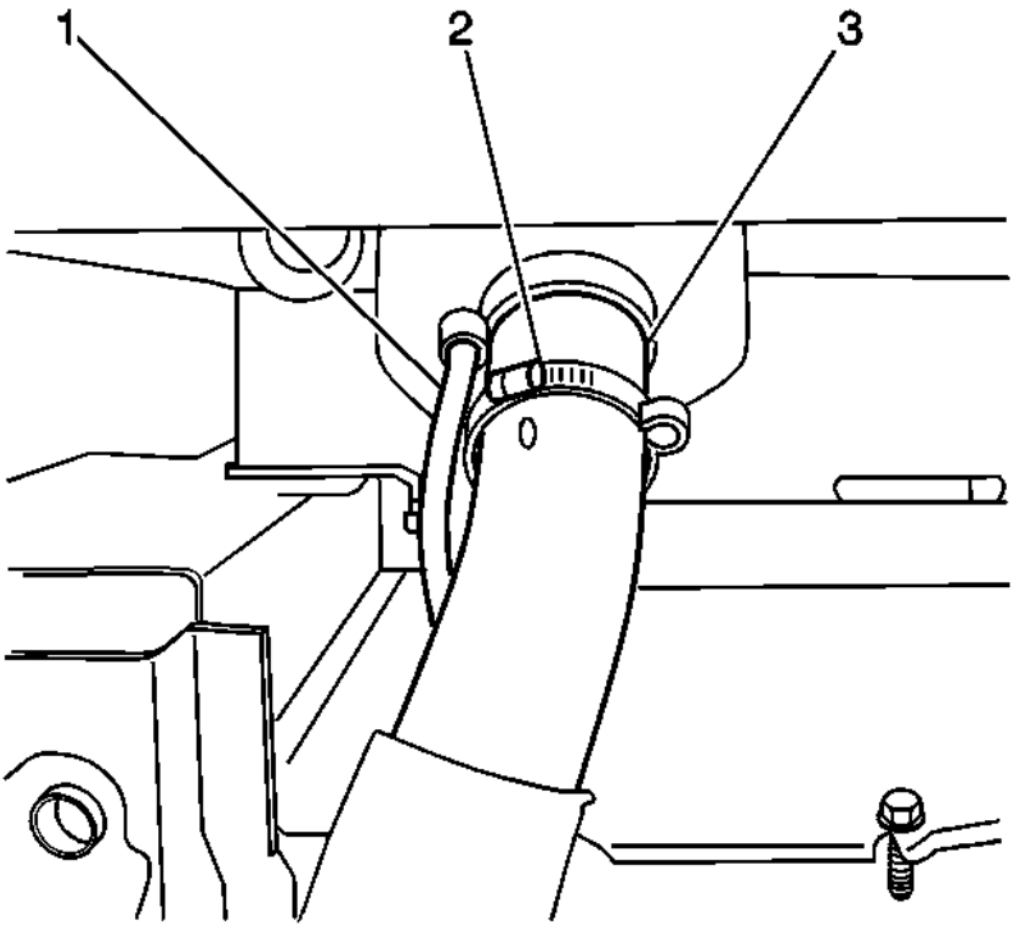


Fig. 48: Vent Hose & Filler Hose Clamp
Courtesy of GENERAL MOTORS CORP.

1. Install the vent hose (1) to the clamp (2) on the filler hose (3).
   - Route the same way as when removed.
   - Ensure that the hose is free of kinks and is routed clear of sharp objects.
   - Ensure that the vent is not plugged.

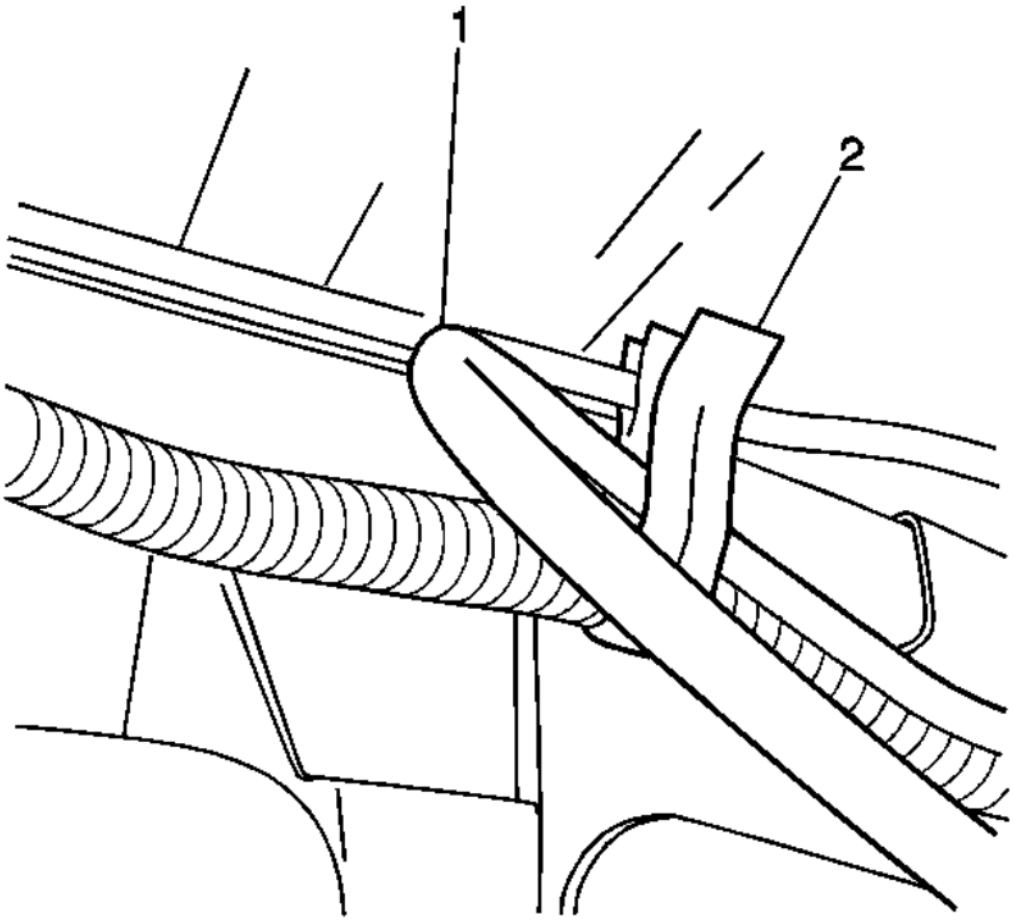


Fig. 49: Vent Hose & Frame Clip
Courtesy of GENERAL MOTORS CORP.

2. Install the vent hose (1) in the clip (2) on the frame.

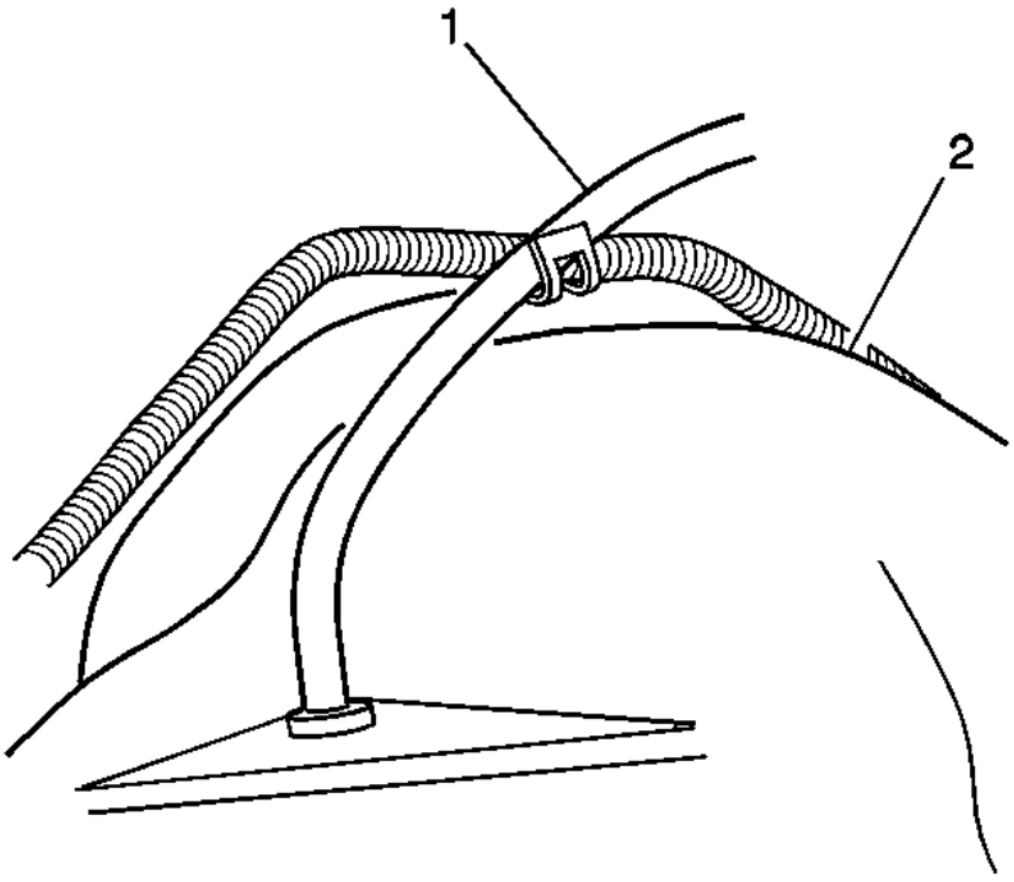


Fig. 50: Vent Hose & Rear Axle
Courtesy of GENERAL MOTORS CORP.

3. Install the vent hose (1) to the top of the rear axle (2).
4. Remove the supports and lower the vehicle.

REAR AXLE HOUSING COVER AND GASKET REPLACEMENT

Removal Procedure

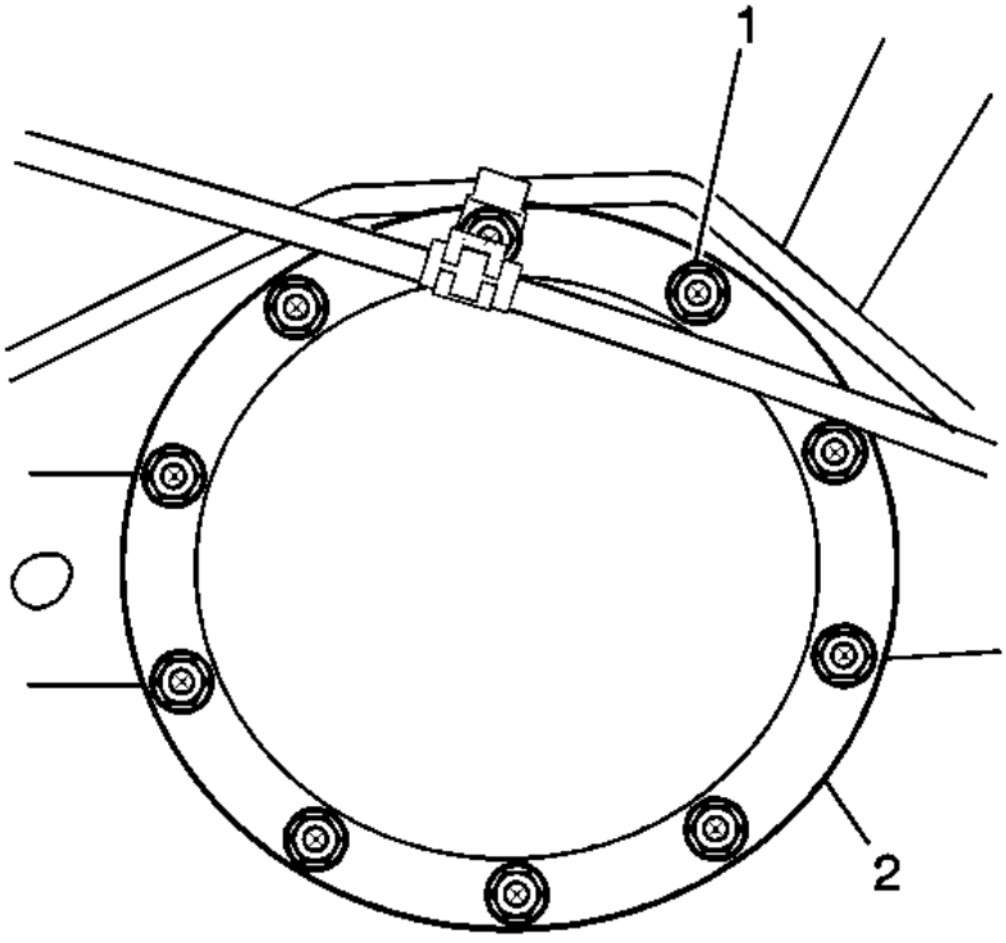


Fig. 51: Identifyng Rear Axle Housing Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the rear axle. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
3. Remove the rear axle housing cover bolts (1).

   Discard the rear axle housing cover bolts.

4. Remove the rear axle housing cover (2) from the axle housing.
    1. Catch the oil in a drain pan.
    2. Remove any gasket material from the rear axle housing and/or the rear axle housing cover.

Installation Procedure

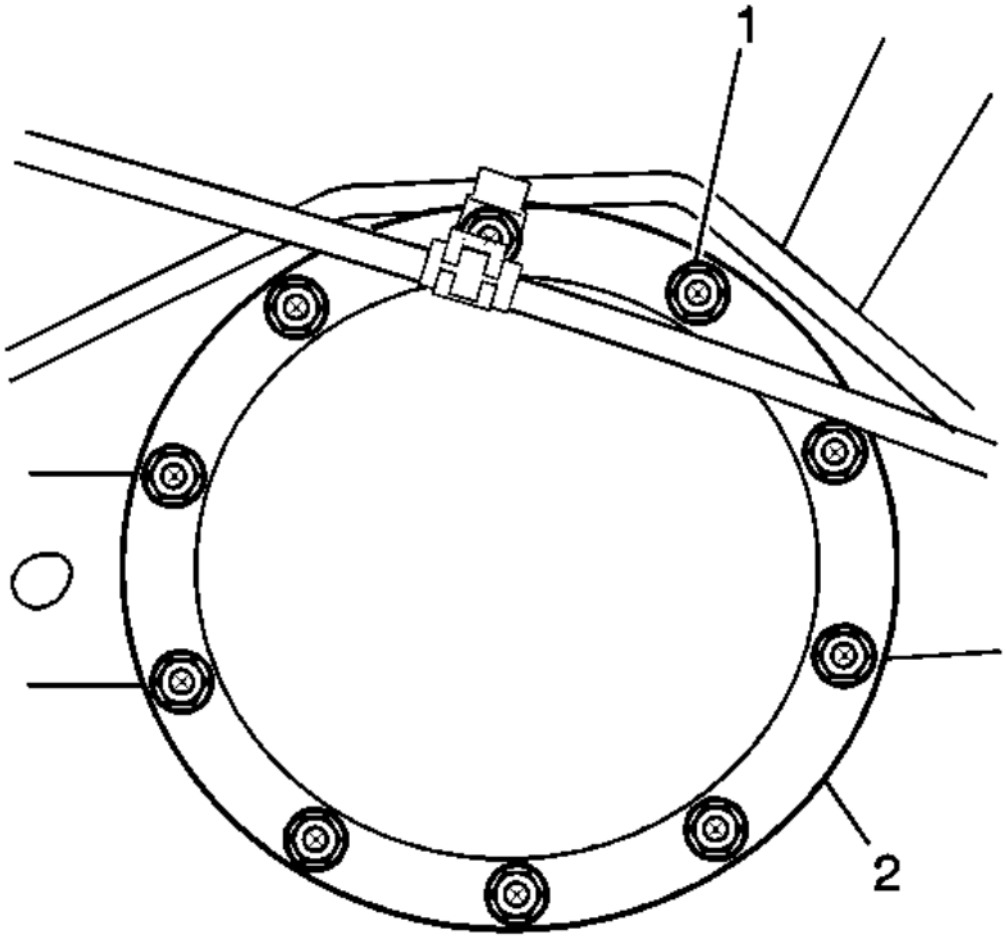


Fig. 52: Identifyng Rear Axle Housing Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

1. Install the rear axle housing cover (2) and a new gasket.

IMPORTANT: Do not reuse the rear axle housing cover bolts.

2. Install the new rear axle housing cover bolts (1).

   Tighten: Tighten the rear axle housing cover bolts in a crosswise pattern to 40 N.m (30 lb ft).

3. Fill the rear axle. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .
4. Lower the vehicle.

REAR AXLE SHAFT REPLACEMENT (8.6 INCH AXLE W/DRUM BRAKE W/VSES)

Special Tools

- **J 2619-01** Slide Hammer
- **J 45859** Axle Remover

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle**
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the rear wheel speed sensor. Refer to **Rear Wheel Speed Sensor Replacement** .
4. Remove the rear cover and gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.

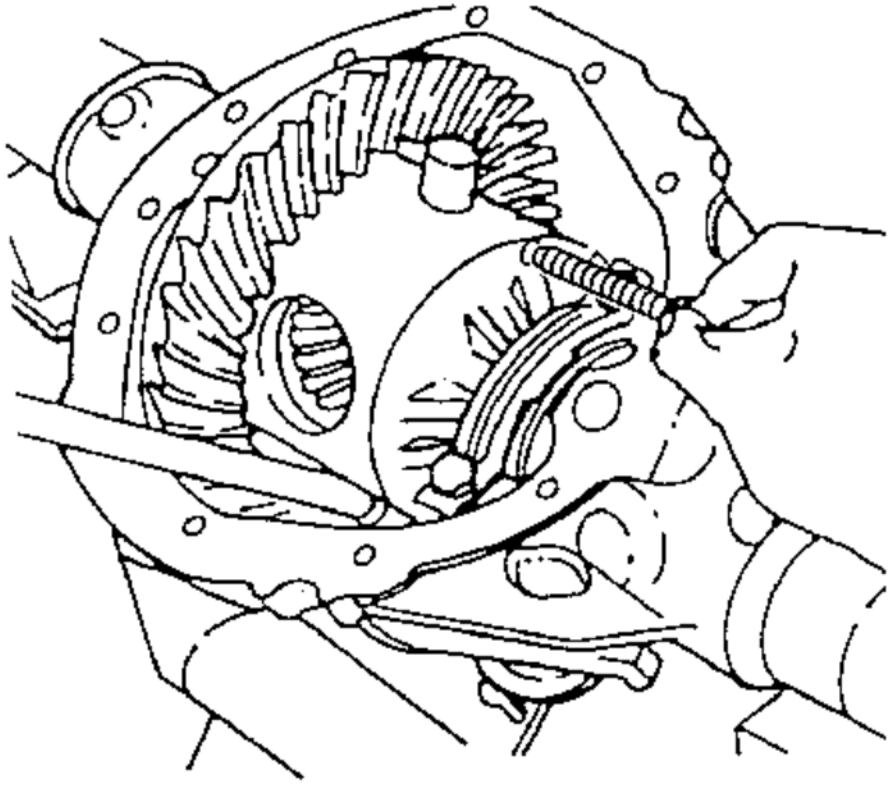


Fig. 53: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

5. Remove the pinion shaft locking bolt.

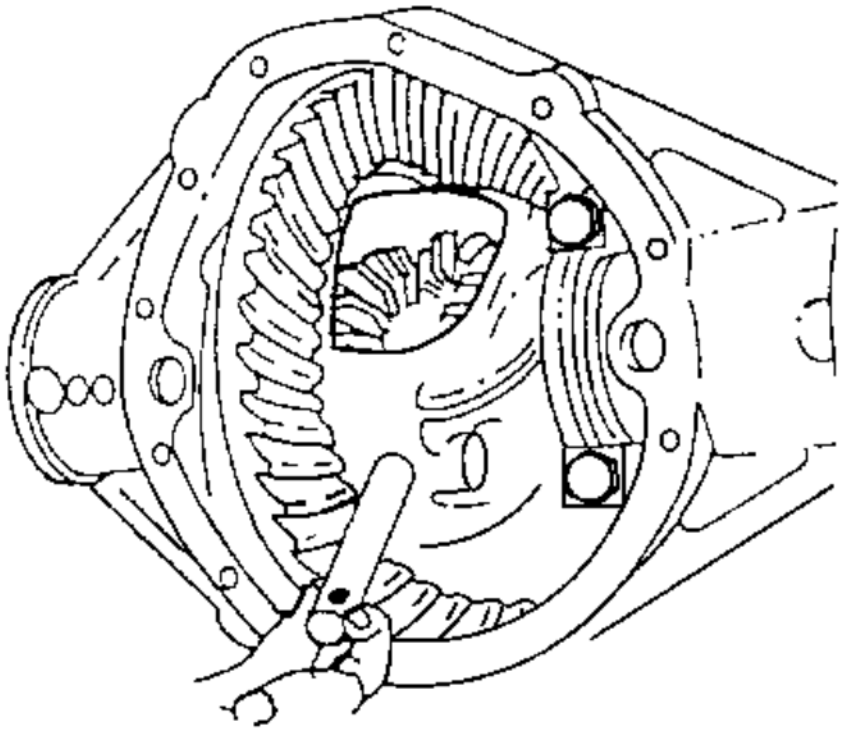


Fig. 54: View Of Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

6. On axles without locking differentials, remove the pinion shaft.

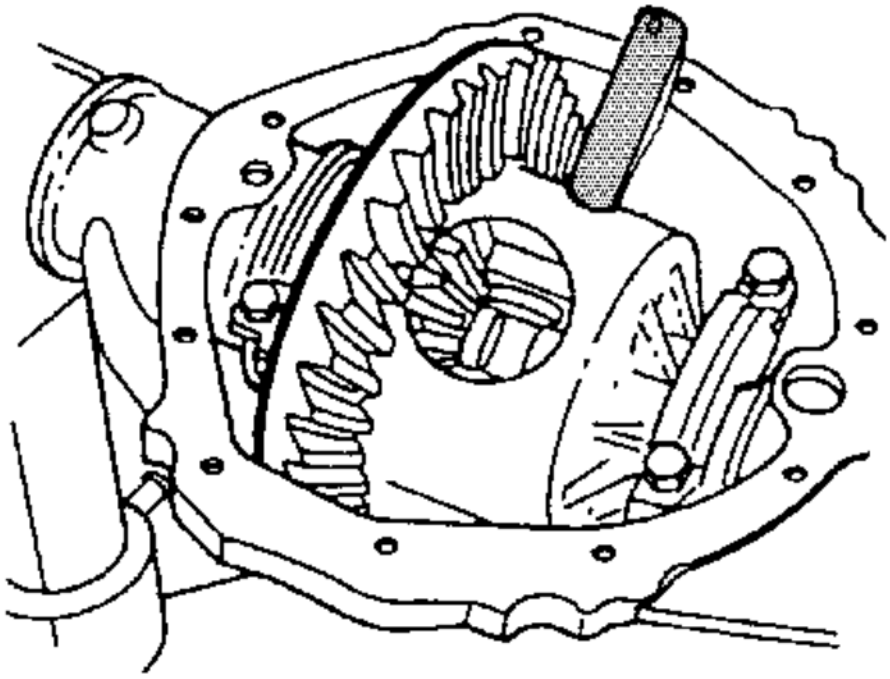


Fig. 55: Pinion Shaft Touching Housing
Courtesy of GENERAL MOTORS CORP.

7. On axles with a locking differential, remove the shaft part way. Rotate the case until the pinion shaft touches the differential housing.

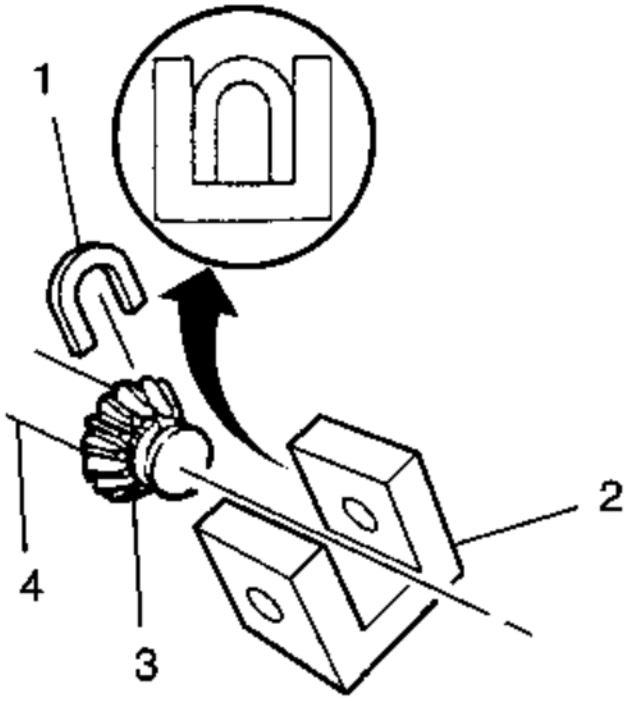


Fig. 56: View Of Axle Shaft, Lock & Thrust Block
Courtesy of GENERAL MOTORS CORP.

8. On axles with a locking differential, use a screw driver, or similar tool, in order to enter the differential case and rotate the C-lock (1) until the C-lock aligns with the thrust block (2).
9. Remove the brake drum.
10. Push inward on the axle shaft.

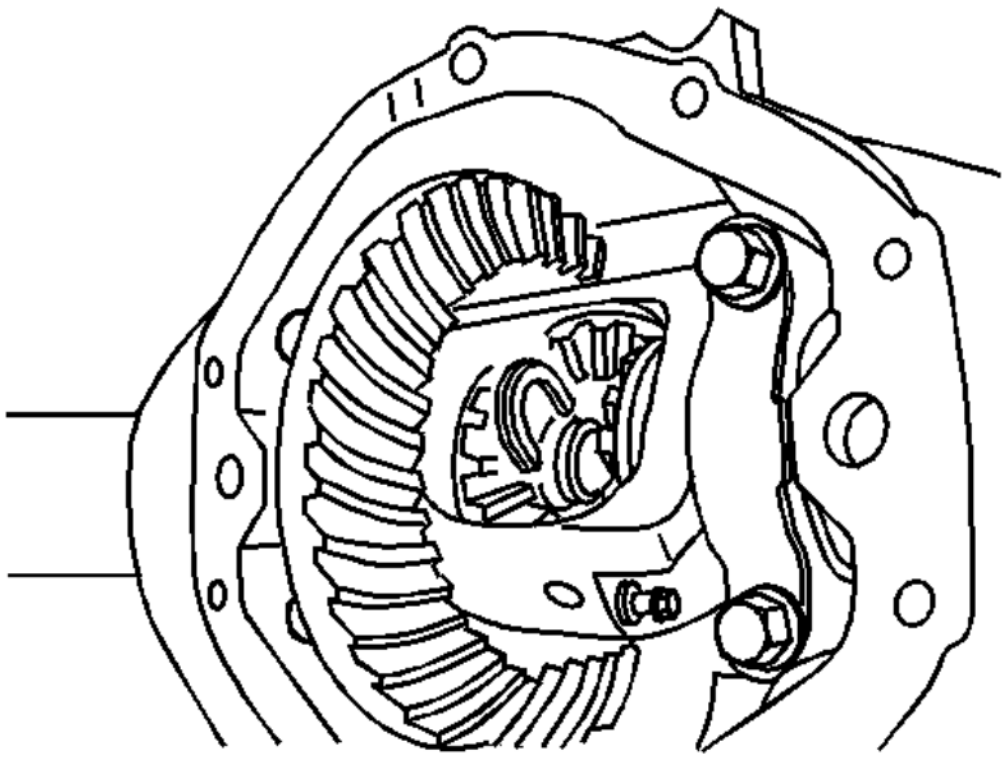


Fig. 57: C-Lock From Button End Of Axle Shaft
Courtesy of GENERAL MOTORS CORP.

11. Remove the C-lock from the axle shaft.
12. Remove the axle shaft from the differential housing.

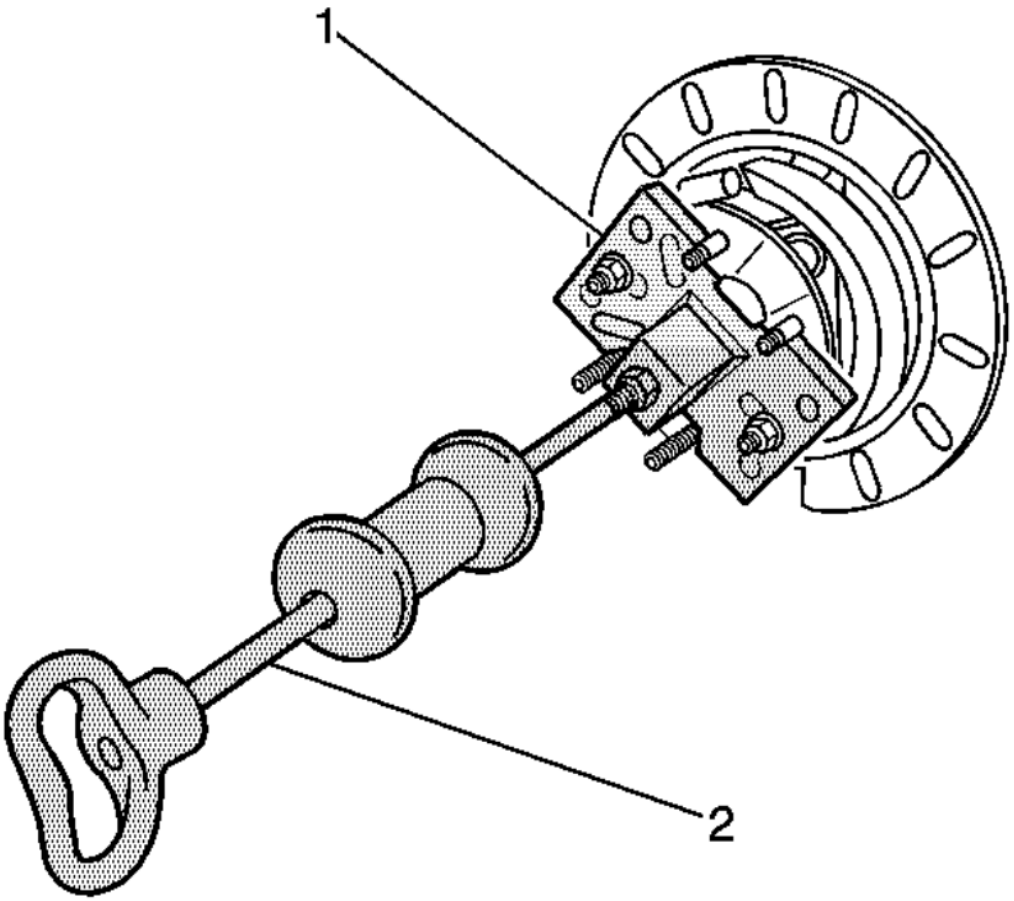


Fig. 58: Removing Axle Shaft Using J 45859 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the axle is difficult to remove, perform the following service procedure.

13. Using the **J 45859** (1) and the **J 2619-01** (2), remove the axle shaft from the differential housing.

Installation Procedure

1. Install the axle shaft in the differential housing allowing the splines to engage the differential side gears.

2. On axles without a locking differential, place the C-lock on the button end of the axle shaft.
3. On axles with a locking differential, keep the pinion shaft partially withdrawn.
4. Install the brake drum

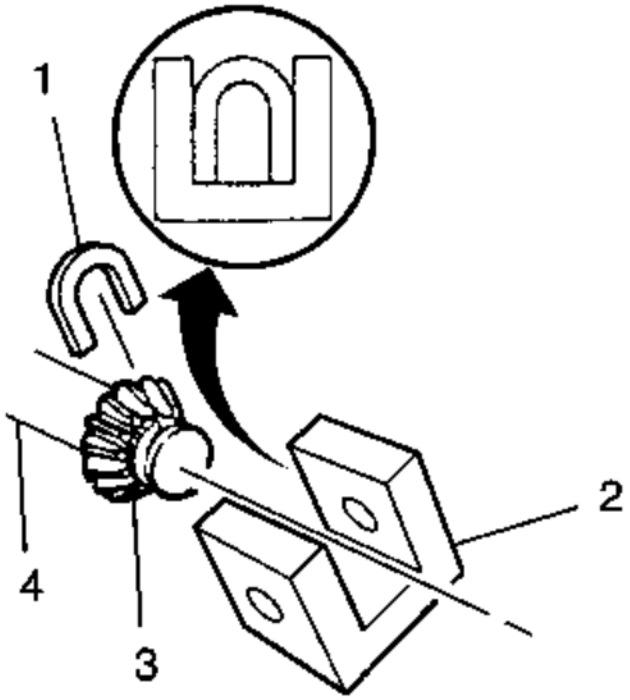


Fig. 59: View Of Axle Shaft, Lock & Thrust Block
Courtesy of GENERAL MOTORS CORP.

5. On axles with a locking differential, place the C-lock (1) on the axle shaft (3) so that the ends are flush with the thrust block (2).

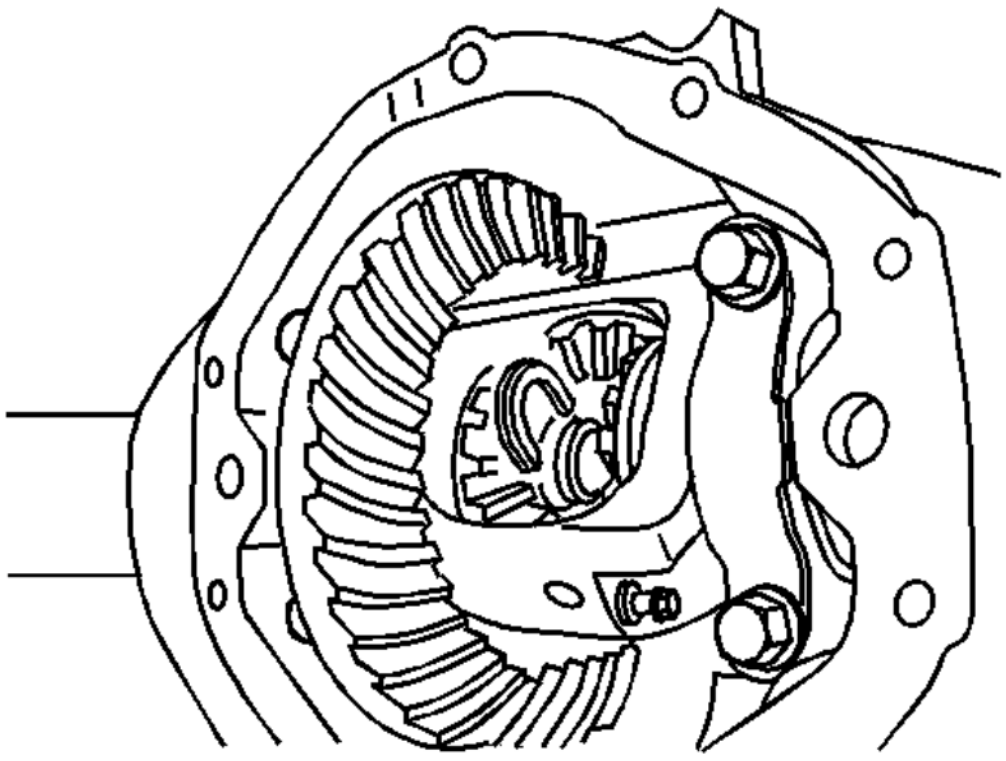


Fig. 60: C-Lock From Button End Of Axle Shaft
Courtesy of GENERAL MOTORS CORP.

6. On axles with a non-locking differential, place the C-lock on the button of the of axle shaft.
7. Pull the axle shaft outward in order to seat the lock in the differential gear.

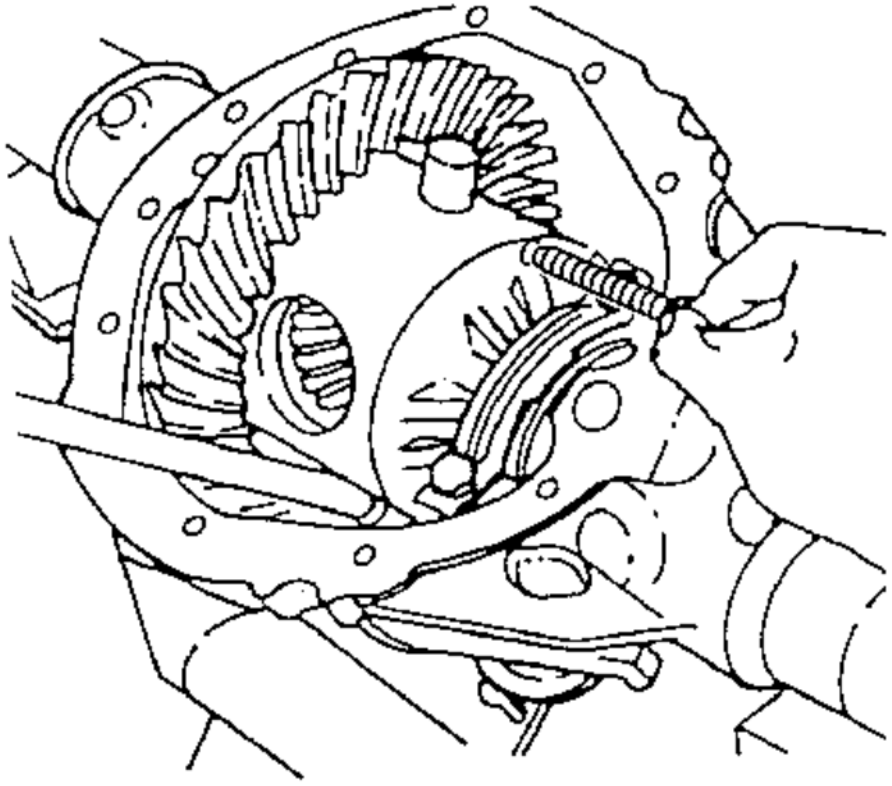


Fig. 61: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

8. Align the hole in the pinion shaft with the bolt hole in the differential case.

NOTE: **Refer to Fastener Notice .**

9. Install the new pinion shaft locking bolt.

Tighten: Tighten the bolt to 34 N.m (25 lb ft).

10. Install the rear axle cover and gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
11. Install the rear wheel speed sensor. Refer to **Rear Wheel Speed Sensor Replacement** .

12. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
13. Fill the rear axle with fluid. Refer to **Rear Axle Lubricant Level Inspection (11.5 Inch Axle)** or **Rear Axle Lubricant Level Inspection (8.6, 9.5 LD Axle)** or **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
14. Remove the support and lower the vehicle.

REAR AXLE SHAFT REPLACEMENT (8.6 INCH AXLE W/DRUM BRAKES W/O VSES)

Removal Procedure

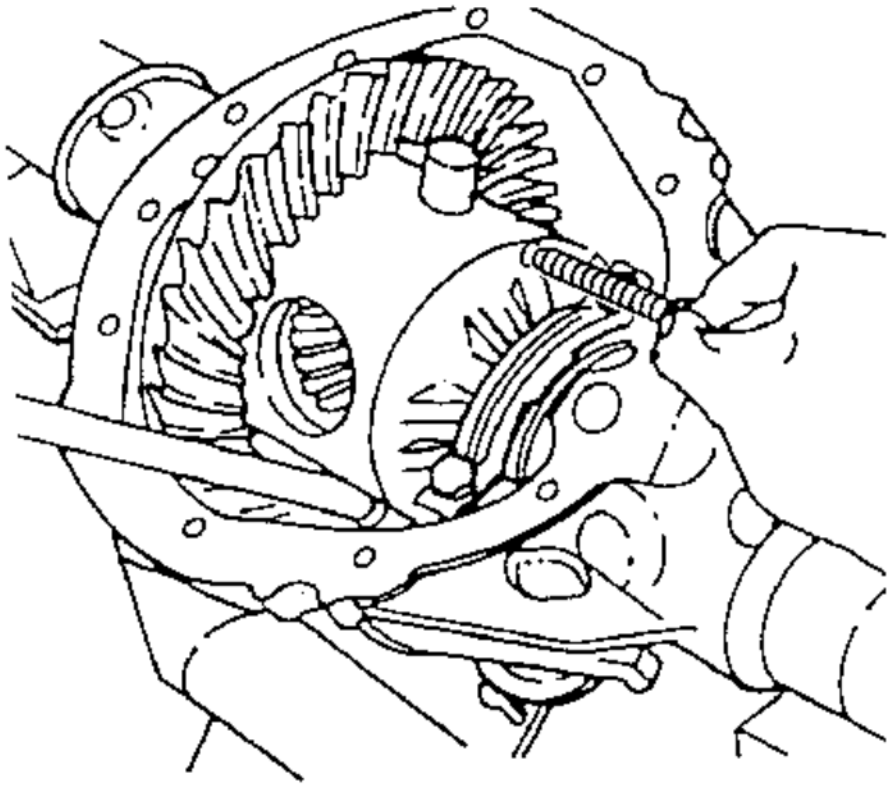


Fig. 62: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

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

2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the rear cover and gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
4. Remove the pinion shaft locking bolt.

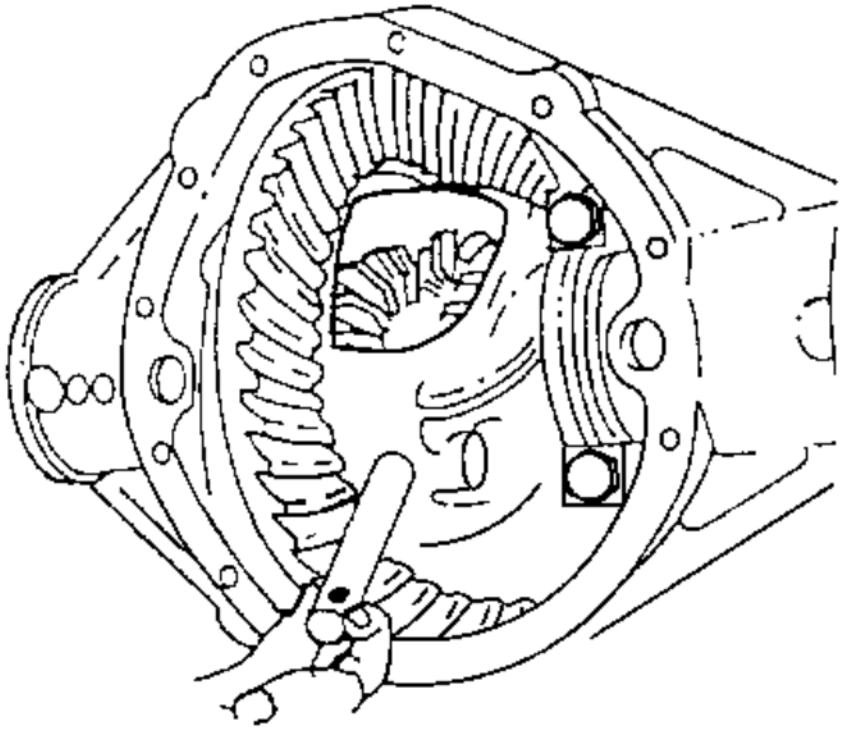


Fig. 63: View Of Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

5. On axles without a locking differential, remove the pinion shaft.

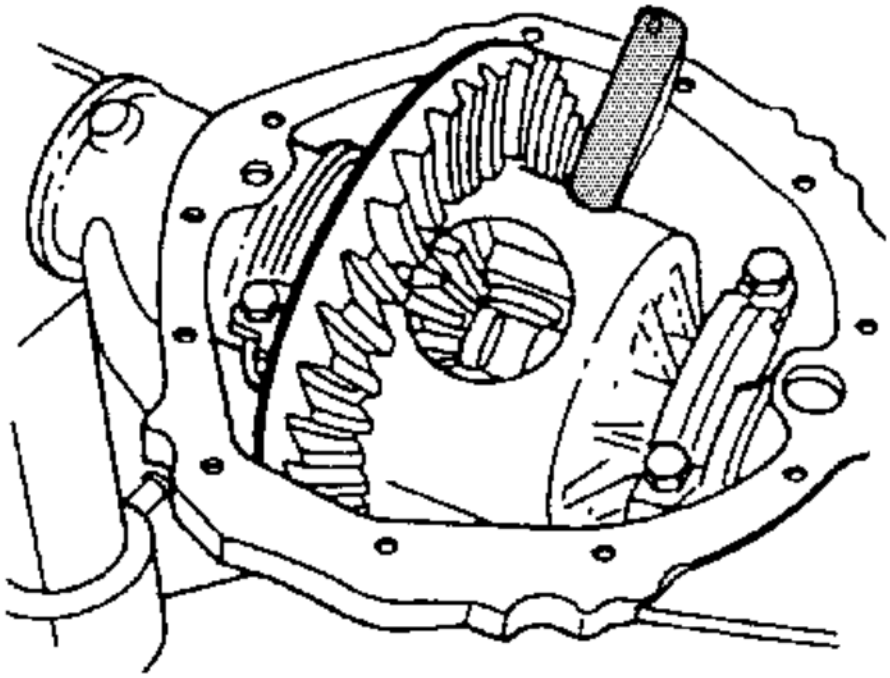


Fig. 64: Pinion Shaft Touching Housing
Courtesy of GENERAL MOTORS CORP.

6. On axles with a locking differential, remove the shaft part way. Rotate the case until the pinion shaft touches the housing.

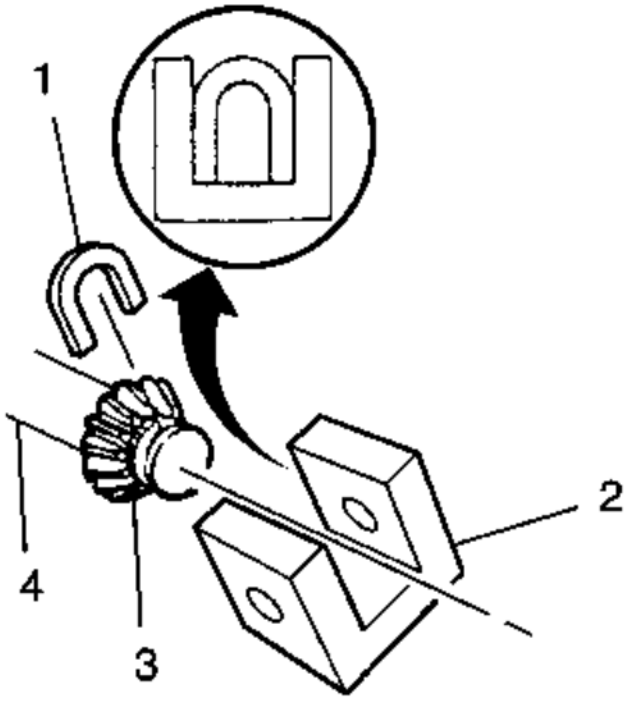


Fig. 65: View Of Axle Shaft, Lock & Thrust Block
Courtesy of GENERAL MOTORS CORP.

7. On axles with a locking differential, use a screwdriver, or a similar tool, in order to enter the differential case and rotate the lock (1) until the lock aligns with the thrust block (2).

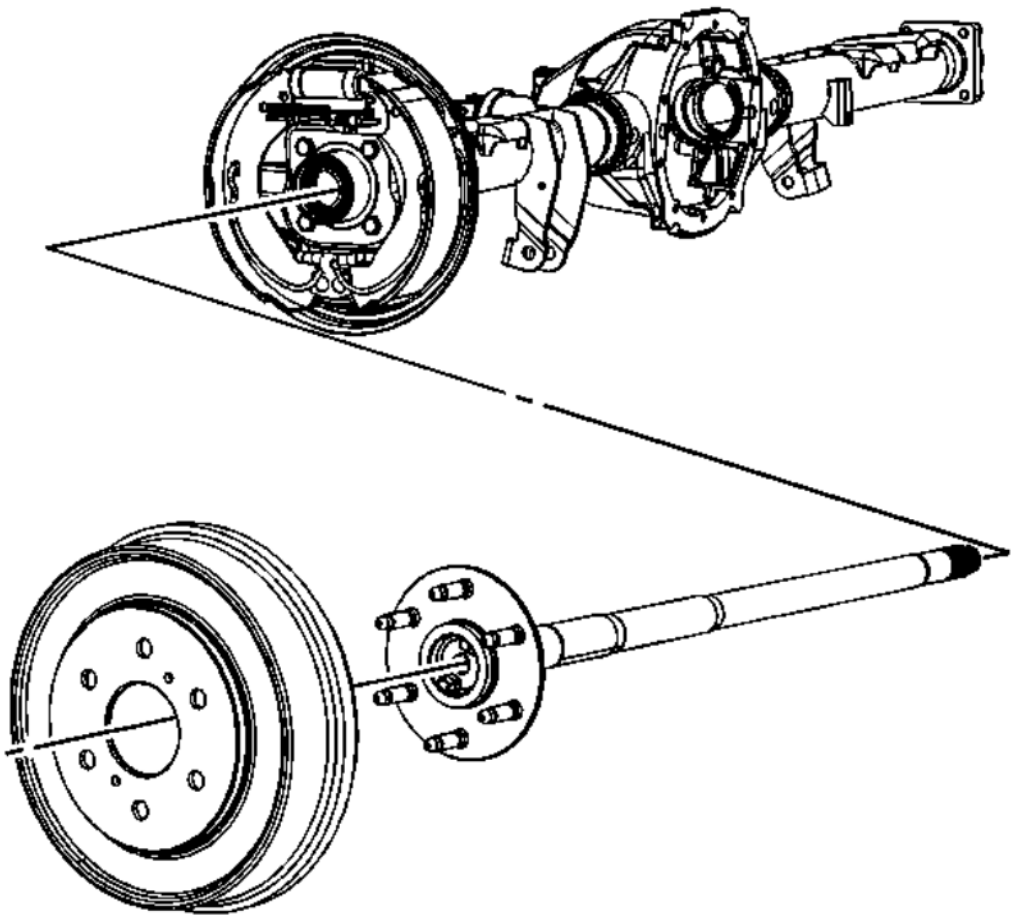


Fig. 66: View Of Axle Shaft & Brake Drum
Courtesy of GENERAL MOTORS CORP.

8. Remove the brake drum.
9. Push the flange of the axle shaft in toward the differential.
10. Remove the C-lock from the button end of the axle shaft.

IMPORTANT: When removing the axle shaft, do not rotate the shaft. Rotating the shaft will misalign the gears. Misaligning the gears will make assembly difficult.

11. Remove the axle shaft from the housing.

Installation Procedure

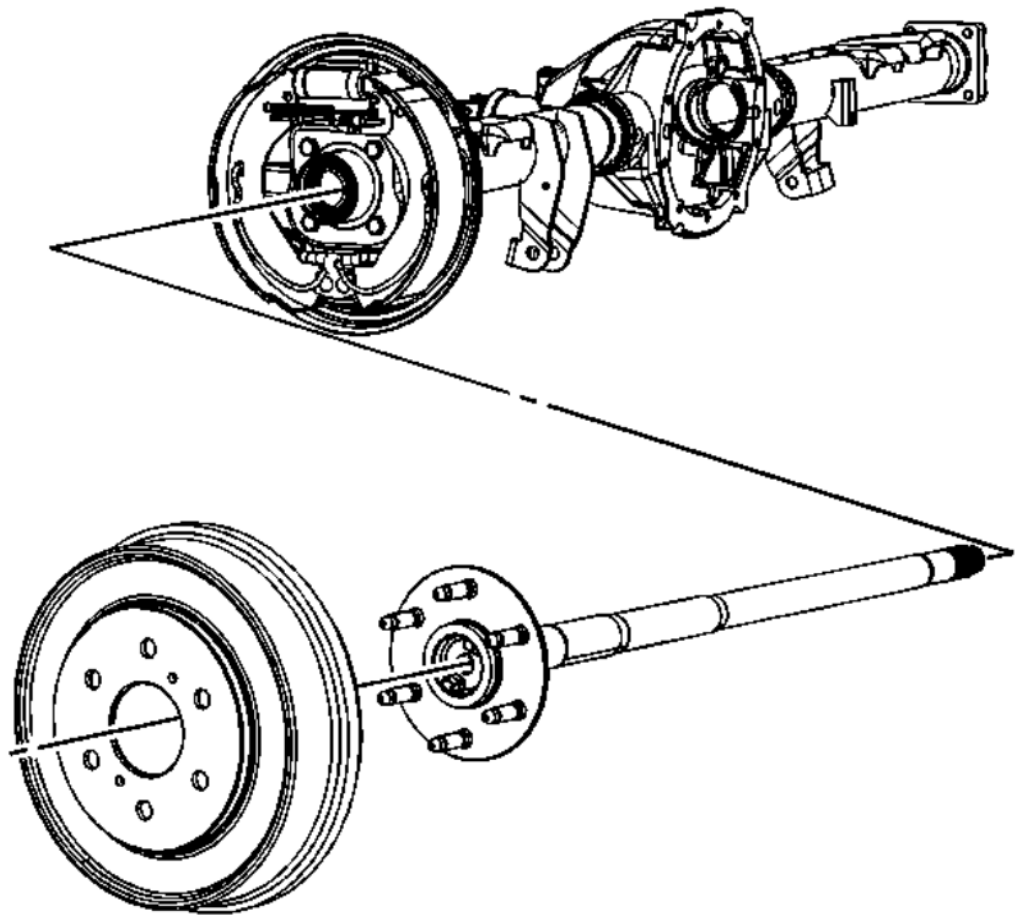


Fig. 67: View Of Axle Shaft & Brake Drum
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Carefully insert the axle shaft in order to not damage the seal.

1. Install the axle shaft into the rear axle housing.
2. Slide the axle shaft into place allowing the splines to engage the differential side gear.
3. On axles without a locking differential, place the C-lock on the button end of the axle shaft.
4. On axles with a locking differential, keep the pinion shaft partially withdrawn.

5. Install the brake drum.

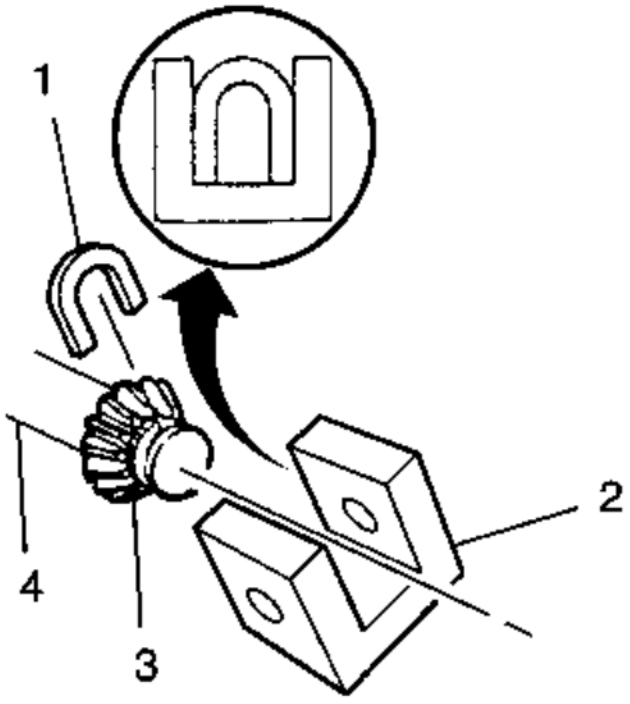


Fig. 68: View Of Axle Shaft, Lock & Thrust Block
Courtesy of GENERAL MOTORS CORP.

6. On axles with a locking differential, place the C-lock (1) on the axle shaft (3) so that the ends are flush with the thrust block (2).
7. Pull the shaft flange outward in order to seat the lock in the differential gear.

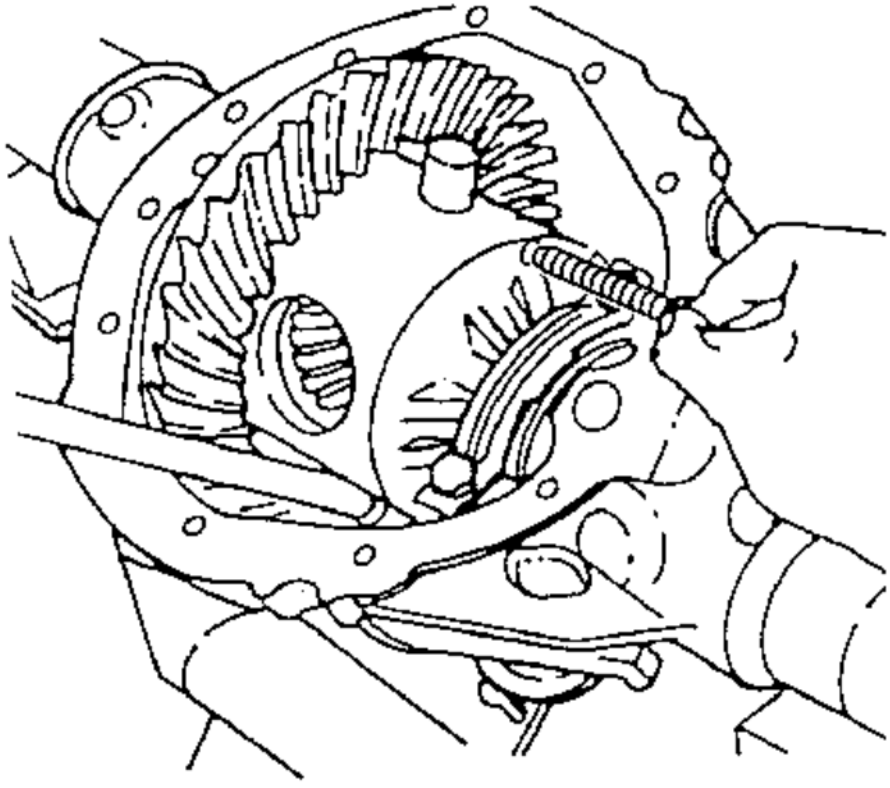


Fig. 69: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

8. Align the hole in the pinion shaft with the bolt hole in the differential case.

NOTE: **Refer to Fastener Notice .**

9. Install the new pinion shaft locking bolt.

Tighten: Tighten the bolt to 34 N.m (25 lb ft).

10. Install the rear cover and the gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
11. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

12. Fill the rear axle, using the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .
13. Lower the vehicle.

REAR AXLE SHAFT REPLACEMENT (8.6, 9.5 INCH AXLES W/VSES)

Special Tools

- **J 2619-01** Slide Hammer
- **J 45859** Axle Remover

Removal Procedure

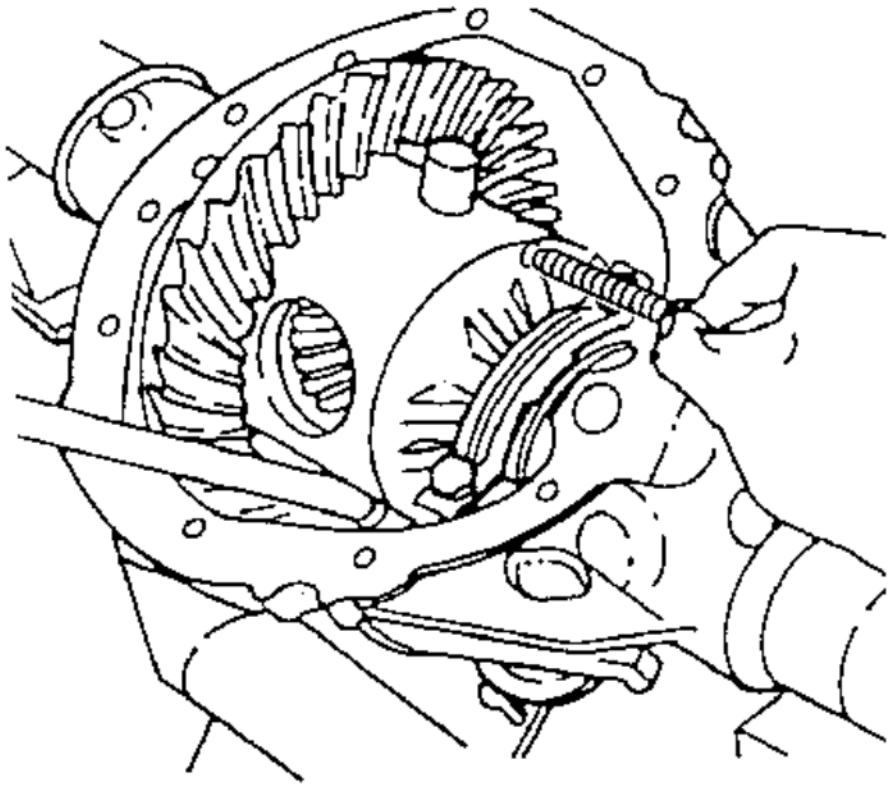


Fig. 70: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the wheel speed sensor. Refer to **Rear Wheel Speed Sensor Replacement** .
4. Remove the brake caliper. Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .
5. Remove the rear cover and the gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
6. Remove the pinion shaft locking bolt.

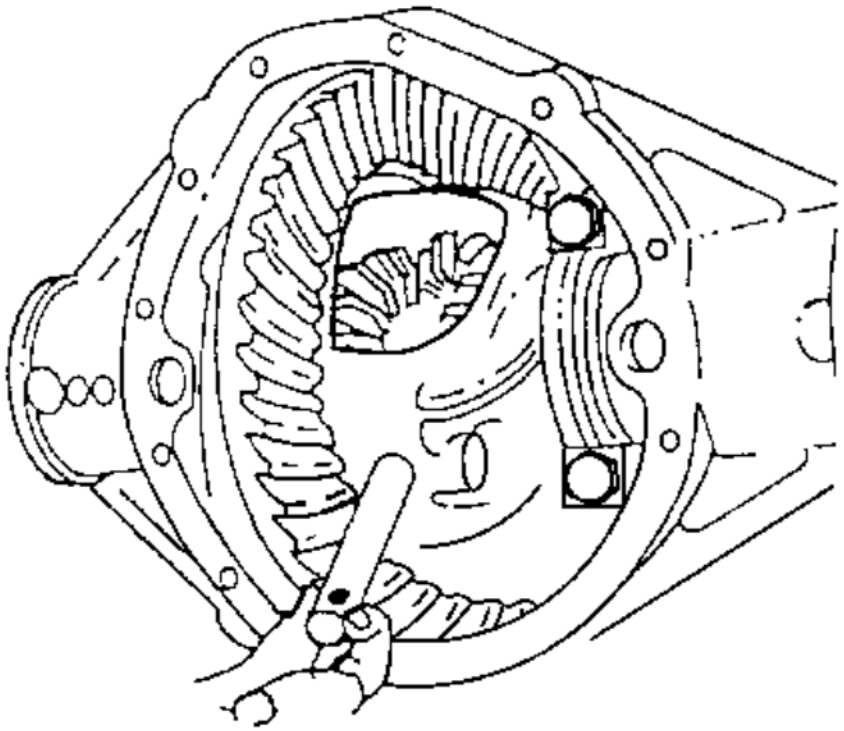


Fig. 71: View Of Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

7. On axles without a locking differential, remove the pinion shaft.

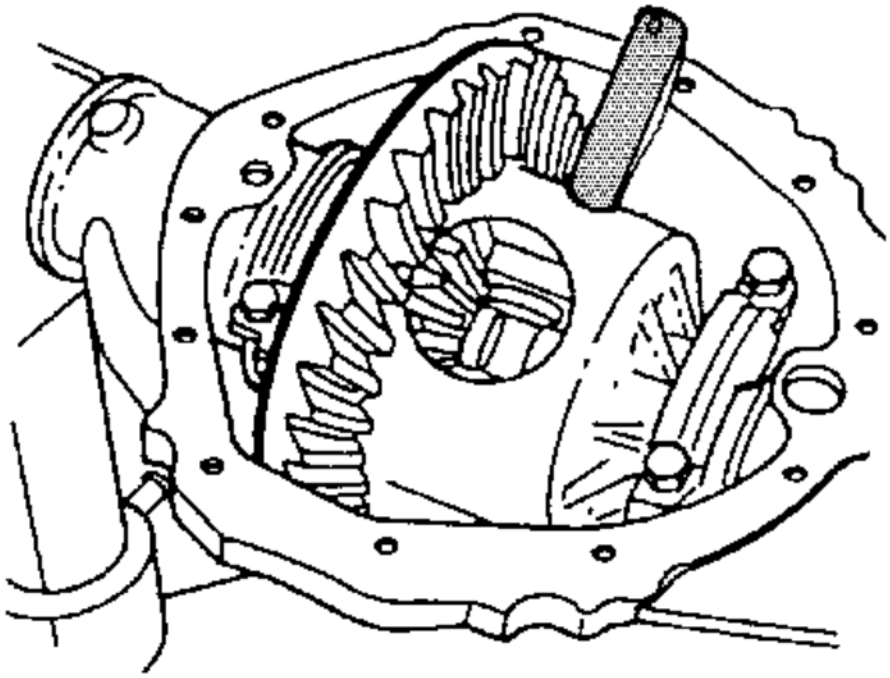


Fig. 72: Pinion Shaft Touching Housing
Courtesy of GENERAL MOTORS CORP.

8. On axles with a locking differential, remove the shaft part way. Rotate the case until the pinion shaft touches the housing.

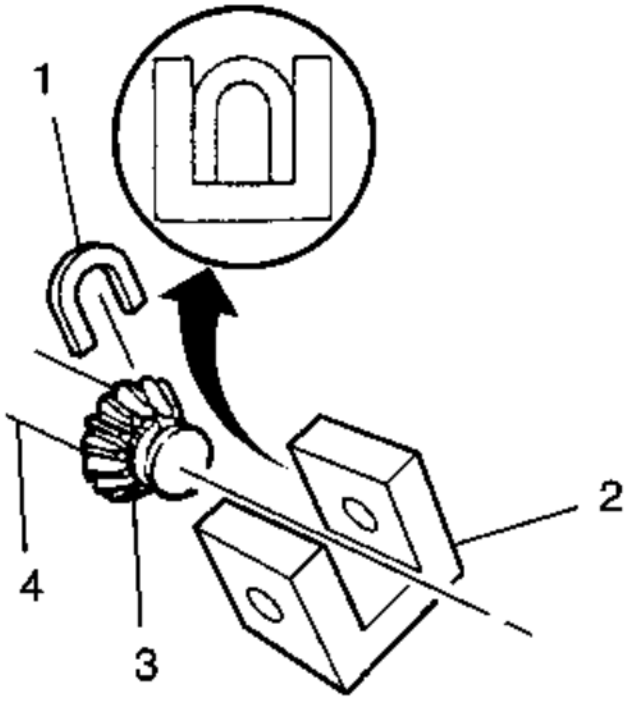


Fig. 73: View Of Axle Shaft, Lock & Thrust Block
Courtesy of GENERAL MOTORS CORP.

9. On axles with a locking differential, use a screwdriver, or a similar tool, in order to enter the differential case and rotate the lock (1) until the lock aligns with the thrust block (2).

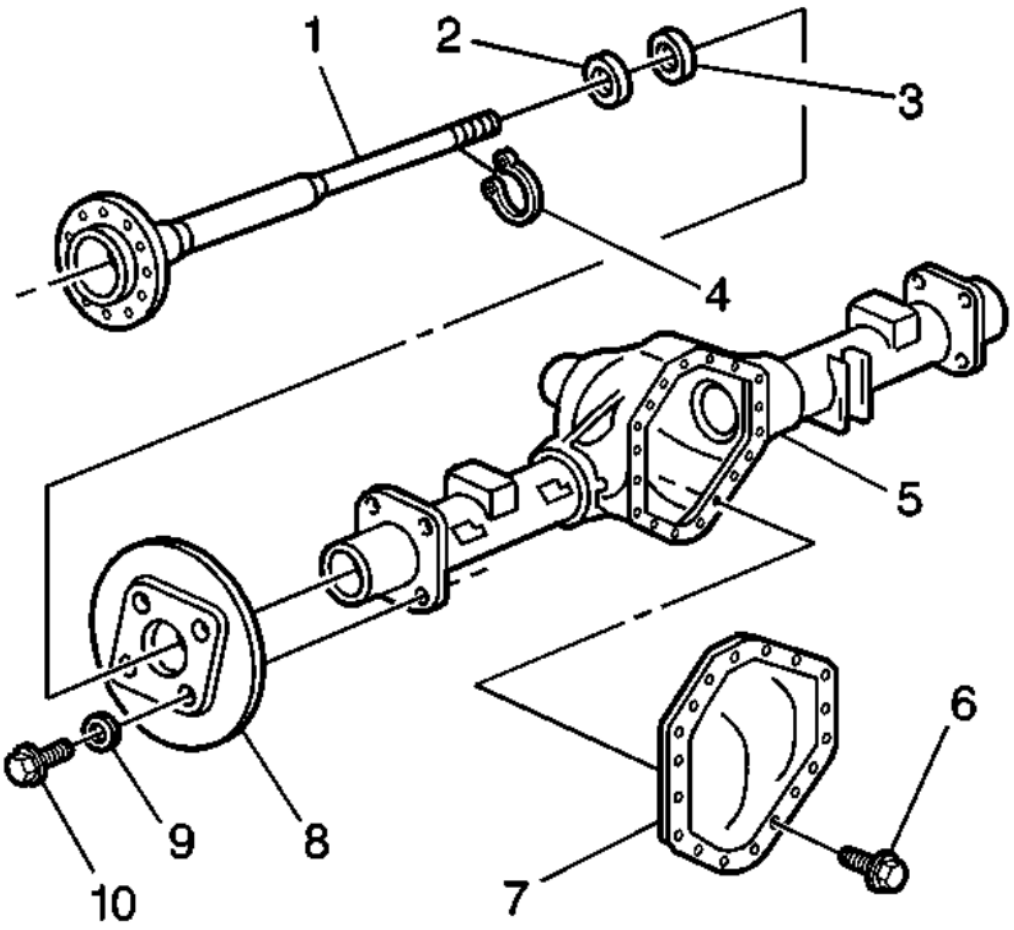


Fig. 74: Axle Shaft Housing & Components
Courtesy of GENERAL MOTORS CORP.

10. Push the flange of the axle shaft (1) toward the differential.
11. Remove the C-lock (4) from the button end of the axle shaft (1).

IMPORTANT: When removing the axle shaft, do not rotate the shaft. Rotating the shaft will misalign the gears. Misaligning the gears will make the assembly difficult.

12. Remove the axle shaft (1) from the housing (5).

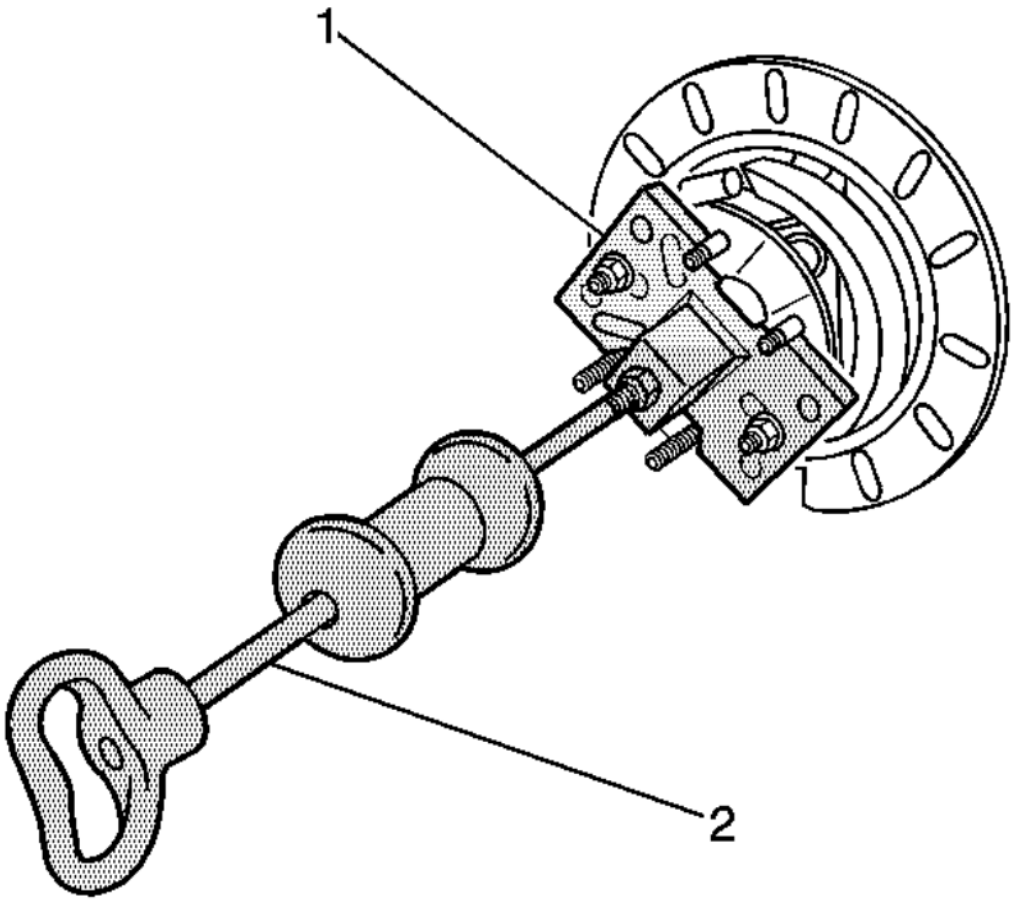


Fig. 75: Removing Axle Shaft Using J 45859 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the rear axle shaft is difficult to remove, perform the following service procedure.

13. Using the **J 45859** and the **J 2619-01** , remove the Axle shaft from the differential housing.

Installation Procedure

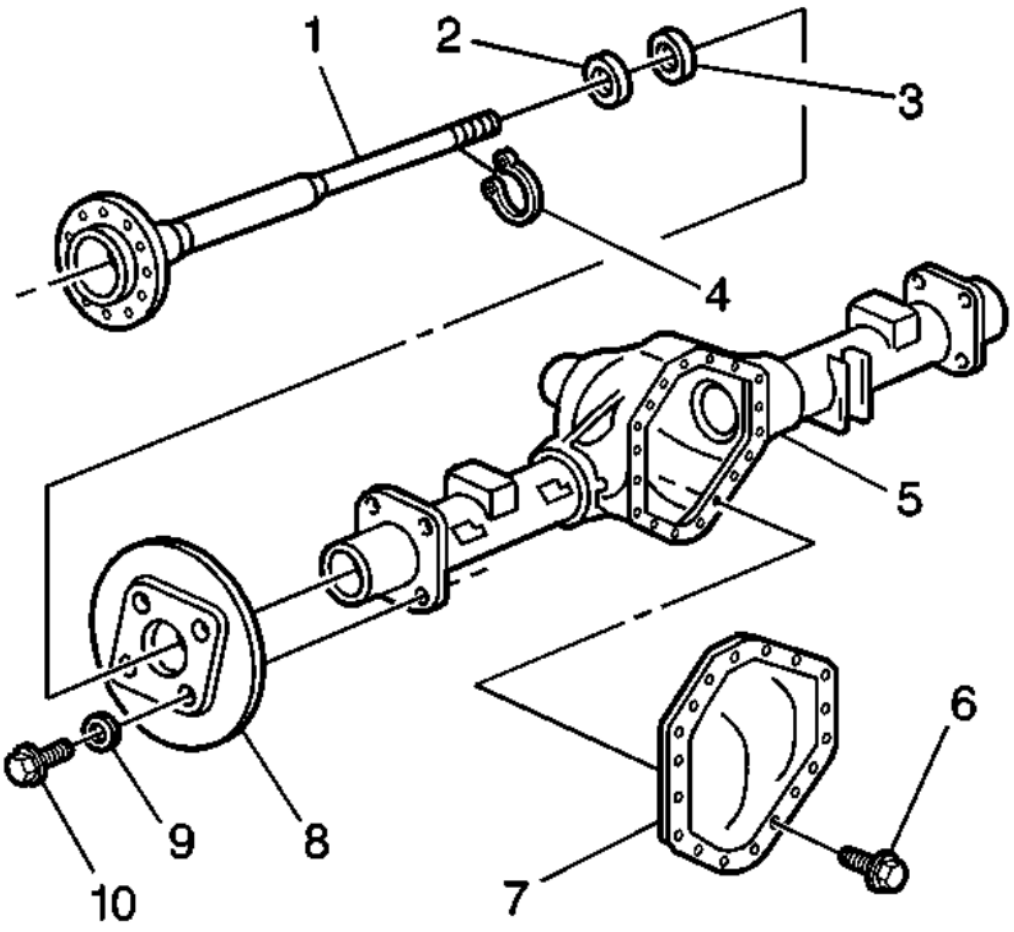


Fig. 76: Axle Shaft Housing & Components
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Carefully insert the axle shaft in order to not damage the seal.

1. Install the axle shaft (1) into the rear axle housing (5).
2. Slide the axle shaft (1) into place allowing the splines to engage the differential side gear.
3. On axles without a locking differential, place the lock (4) on the button end of the axle shaft (1).
4. On axles with a locking differential, keep the pinion shaft partially withdrawn.

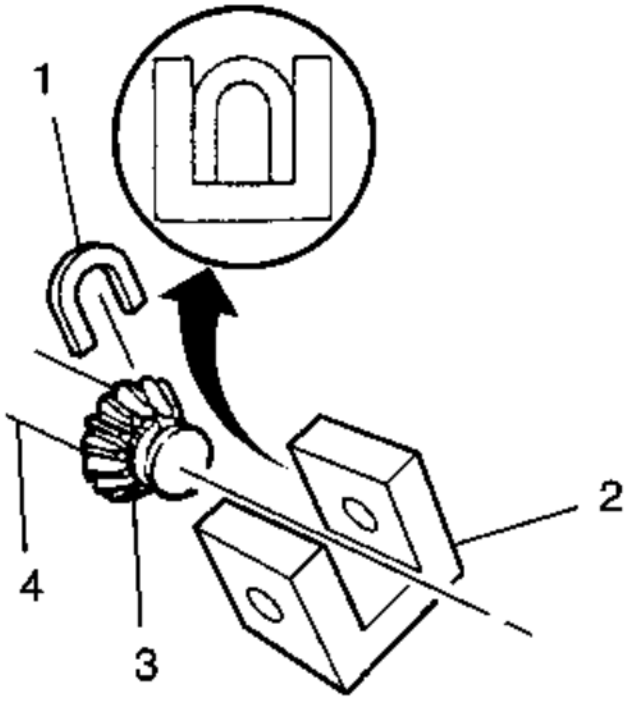


Fig. 77: View Of Axle Shaft, Lock & Thrust Block
Courtesy of GENERAL MOTORS CORP.

5. On axles with a locking differential, place the C-lock (1) on the axle shaft (3) so that the ends are flush with the thrust block (2).
6. Pull the shaft flange outward in order to seat the lock in the differential gear.

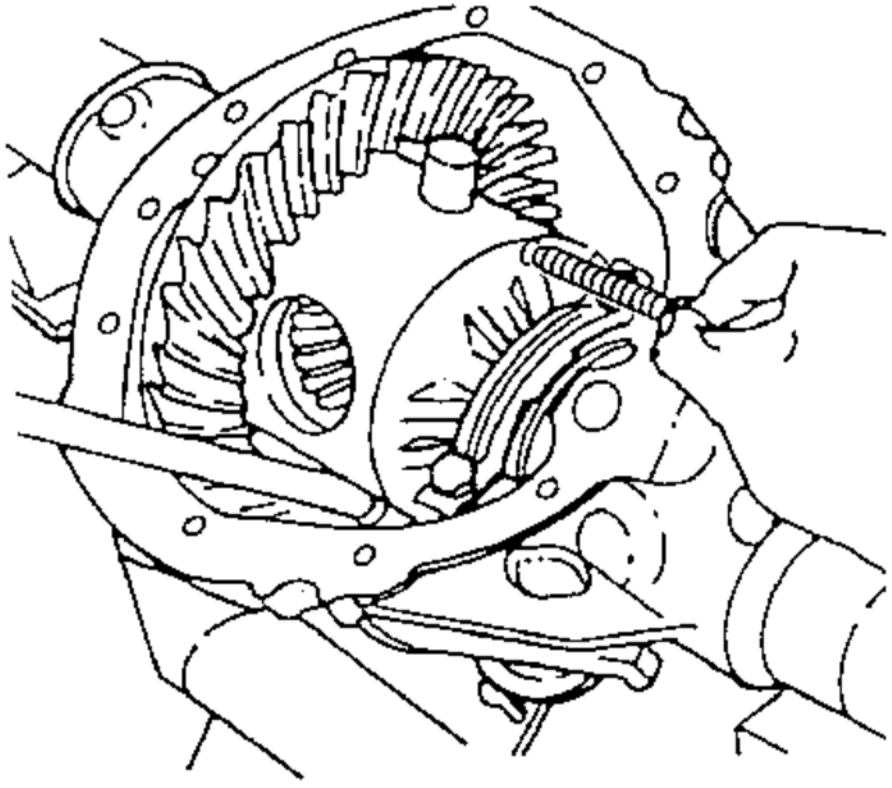


Fig. 78: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

7. Align the hole in the pinion shaft with the bolt hole in the differential case.

NOTE: **Refer to Fastener Notice .**

8. Install the new pinion shaft locking bolt.

Tighten:

- For the 8.6 inch axle, tighten the pinion shaft locking bolt to 36 N.m (27 lb ft).
- For the 9.5/9.6LD inch axle, tighten the pinion shaft locking bolt to 50 N.m (37 lb ft).

9. Install the rear cover and the gasket. Refer to **Rear Axle Housing Cover and Gasket**

Replacement.

10. Install the brake caliper. Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .
11. Install the wheel speed sensor. Refer to **Rear Wheel Speed Sensor Replacement** .
12. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
13. Fill the rear axle. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .
14. Lower the vehicle.

REAR AXLE SHAFT SEAL AND/OR BEARING REPLACEMENT (W/O VSES)

Speical Tools

- **J 2619-01** Slide Hammer
- **J 8092** Universal Driver Handle 3/4 in-10
- **J 21128** Axle Pinion Oil Seal Installer
- **J 23690** Axle Shaft Bearing Installer
- **J 44685** Rear Axle Seal and Bearing Remover. See **Special Tools**.
- **J 45857** Tone Wheel and/or Bearing Remover

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the rear axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)**.

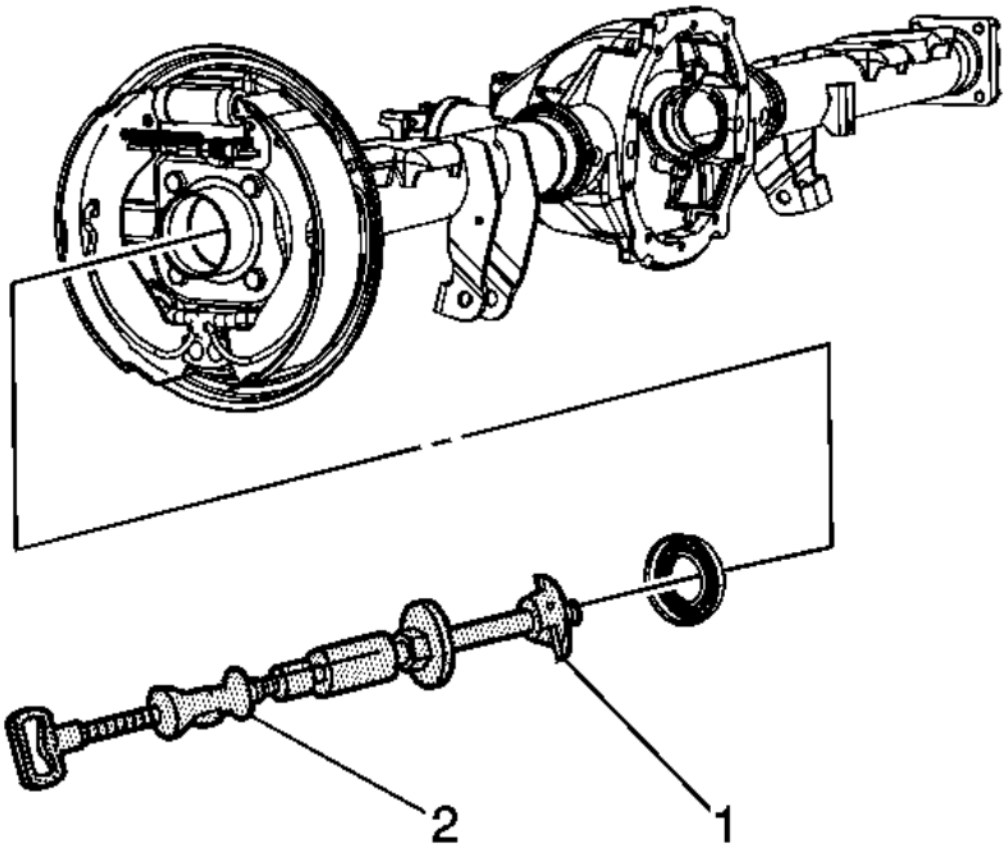


Fig. 79: View Of Axle Shaft Seal & Bearing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The following service procedure is for NON-VSES vehciles.

4. Using the **J 44685** (1) and the **J 2619-01** (2), remove the axle shaft seal. See **Special Tools**.

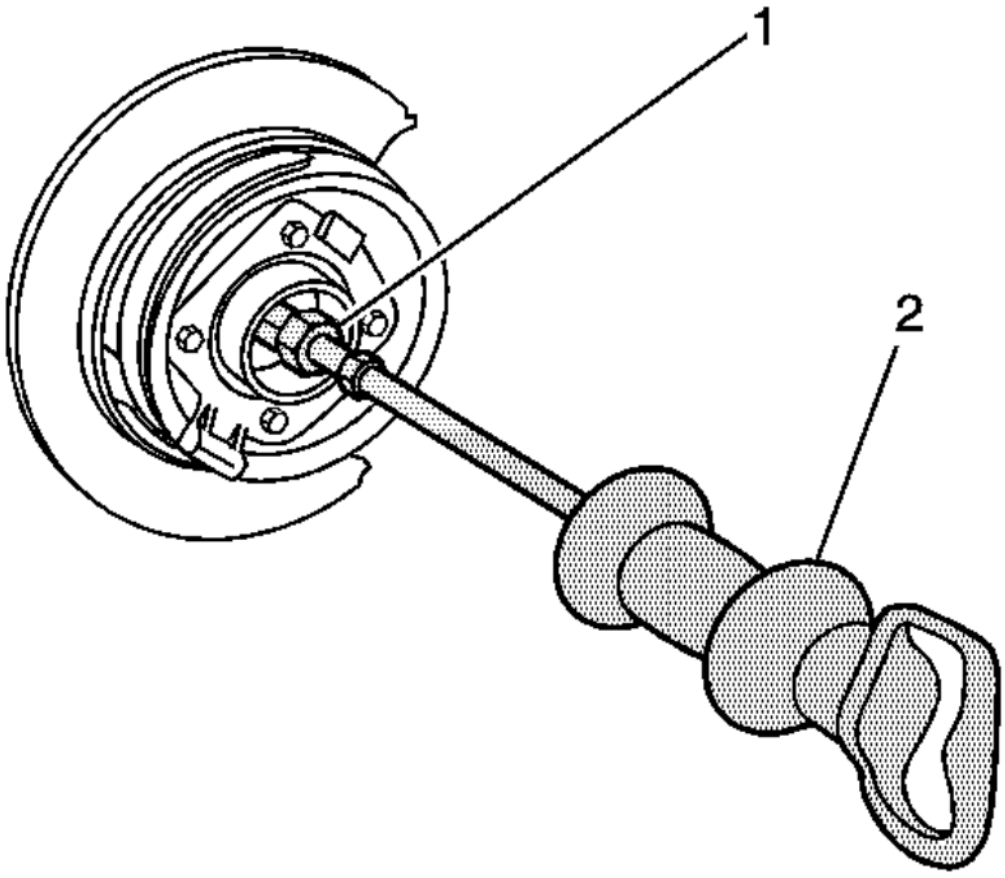


Fig. 80: Removing Axle Shaft Seal & Bearing Using J 45857 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The following service procedure is for VSES equipped vehicles.

5. Using the **J 45857** (1) and the **J 2619-01** (2), remove the axle seal, bearing, and the tone wheel.

Installation Procedure

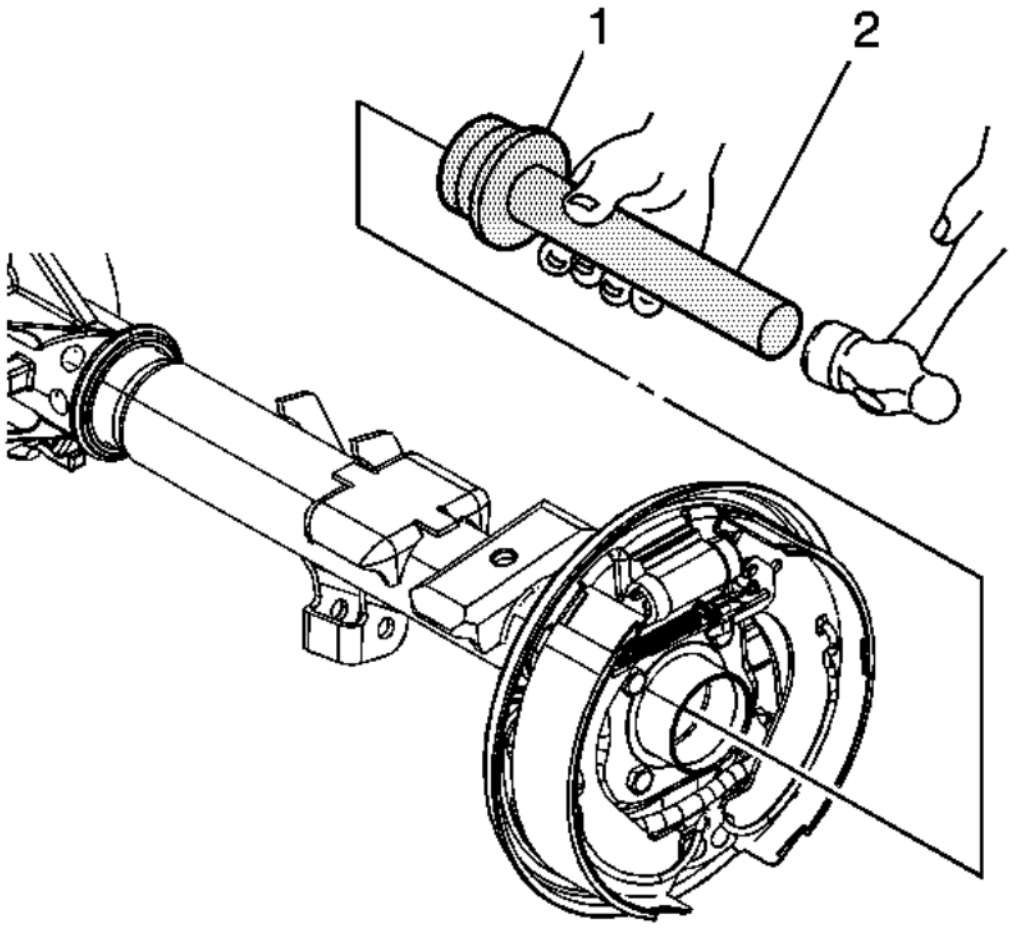


Fig. 81: Installing Axle Shaft Bearing
Courtesy of GENERAL MOTORS CORP.

1. Using the **J 23690** (1) and the **J 8092** (2), install the axle shaft bearing.
2. Drive the axle shaft bearing into the housing until the tool bottoms against the tube.

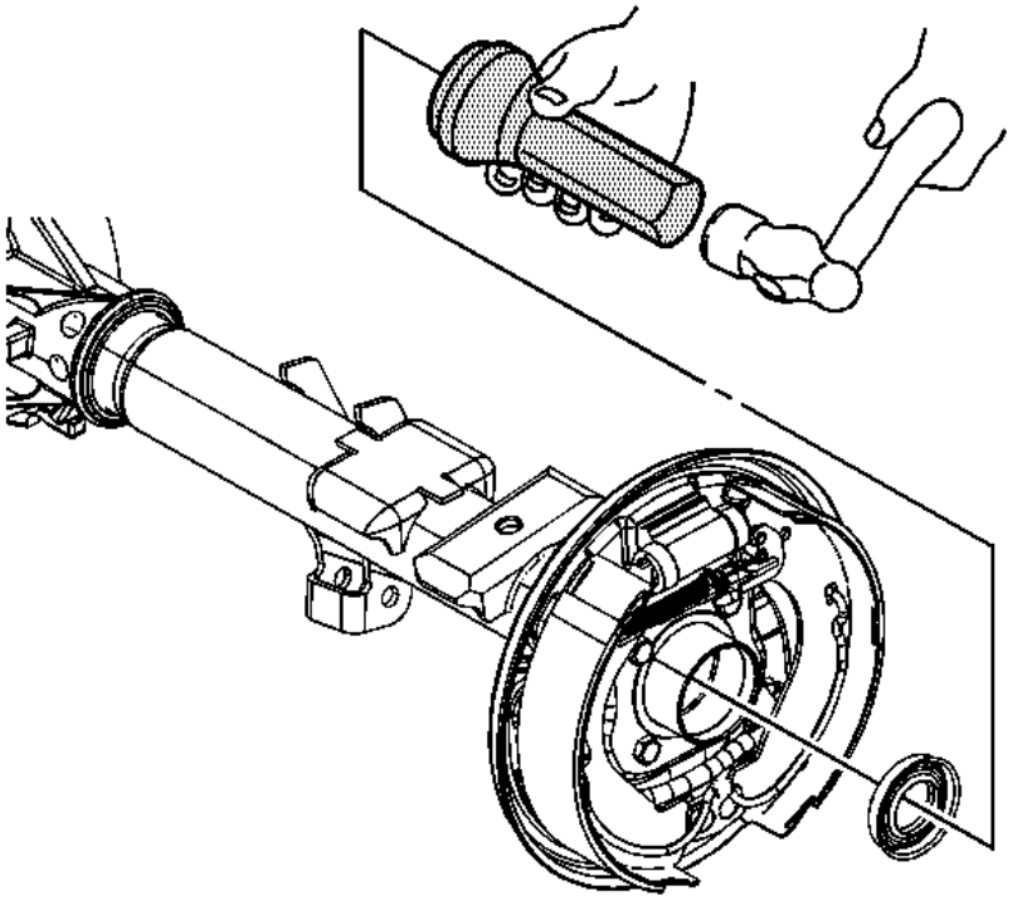


Fig. 82: Installing Axle Shaft Seal
Courtesy of GENERAL MOTORS CORP.

3. Using the **J 21128** , install the axle seal.
4. Drive the tool into the bore until the axle shaft seal is flush with the axle shaft tube.
5. Install the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)**.
6. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
7. Remove the support and lower the vehcile.

REAR AXLE SHAFT SEAL AND/OR BEARING REPLACEMENT (W VSES)

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 21128** Axle Pinion Oil Seal Installer
- **J 23690** Bearing Installer
- **J 2619-01** Slide Hammer
- **J 45857** Tone Wheel and/or Bearing Remover

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the rear axle housing cover. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
4. Remove the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)**.
5. To remove the seal only, use a suitable seal remover.

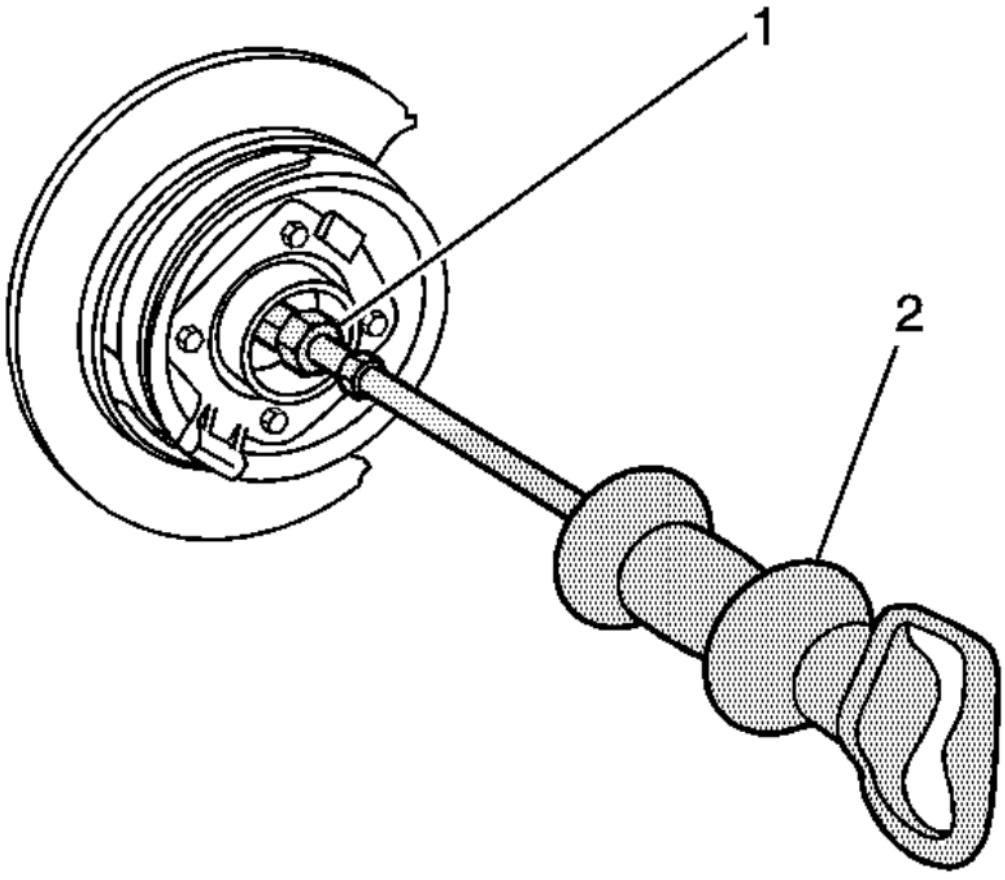


Fig. 83: Removing Axle Shaft Seal & Bearing Using J 45857 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

6. To remove the axle shaft seal and the bearing together from the axle housing, use the **J 45857** (1) and the **J 2619-01** (2).

Installation Procedure

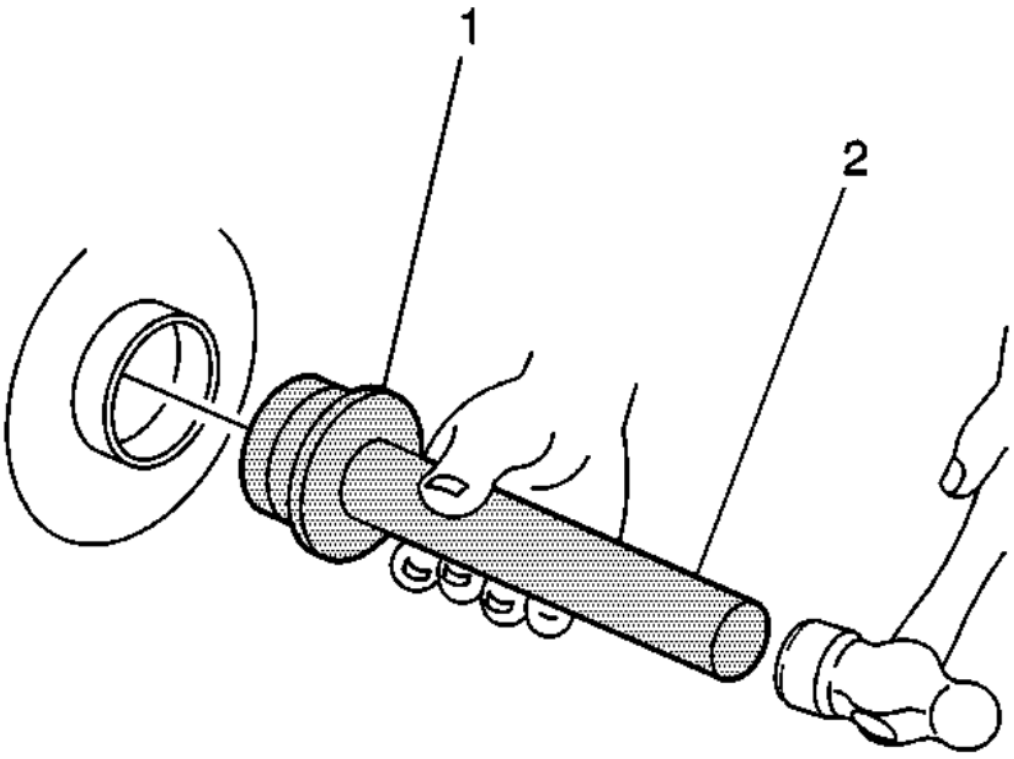


Fig. 84: Installing Axle Shaft Bearing Using J 23690 Or J 29709 & J 8092
Courtesy of GENERAL MOTORS CORP.

1. Install the axle shaft bearing using the **J 23690** (1) and the **J 8092** (2).
2. Drive the axle shaft bearing into the axle housing until the tool bottoms against the tube.

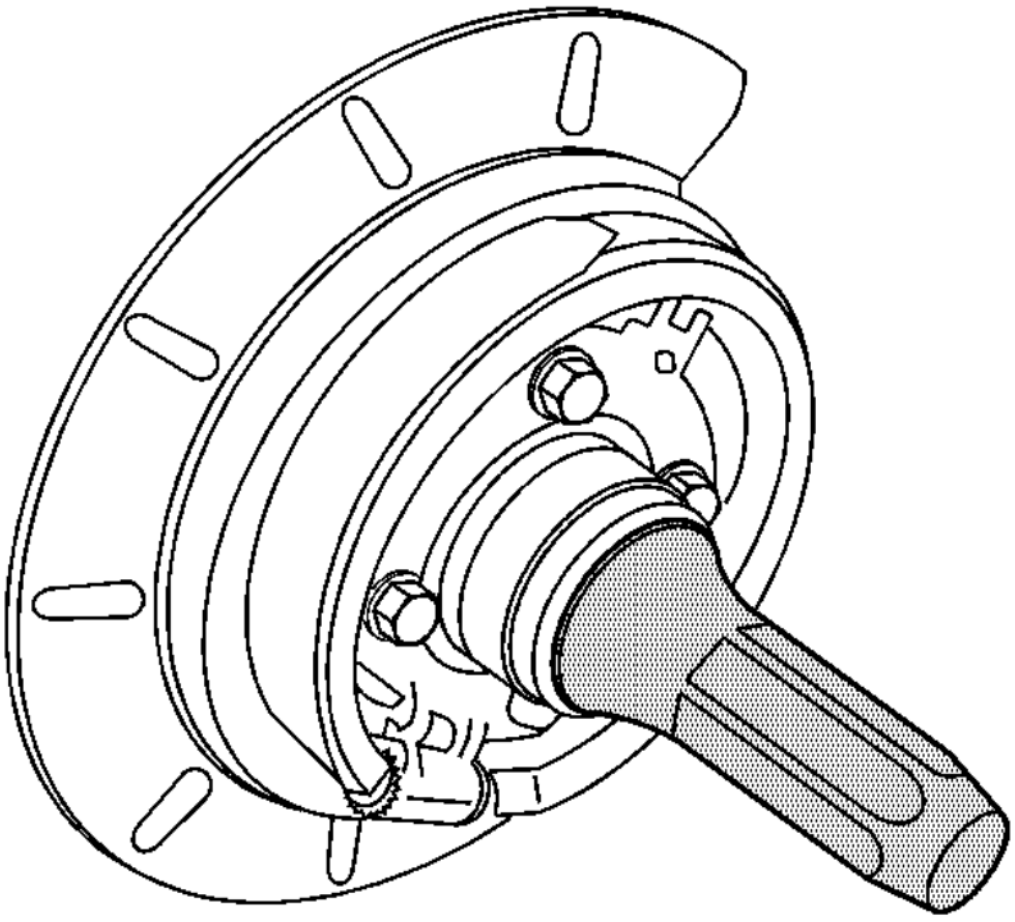


Fig. 85: Installing Axle Shaft Seal Using J 21128
Courtesy of GENERAL MOTORS CORP.

3. Install the axle shaft seal using the **J 21128** .
4. Drive the tool into the bore until the axle shaft seal bottoms flush with the tube.
5. Install the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)**.
6. Install the rear axle housing cover. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

8. Fill the rear axle. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
9. Lower the vehicle.

REAR AXLE SHAFT AND/OR GASKET REPLACEMENT

Removal Procedure

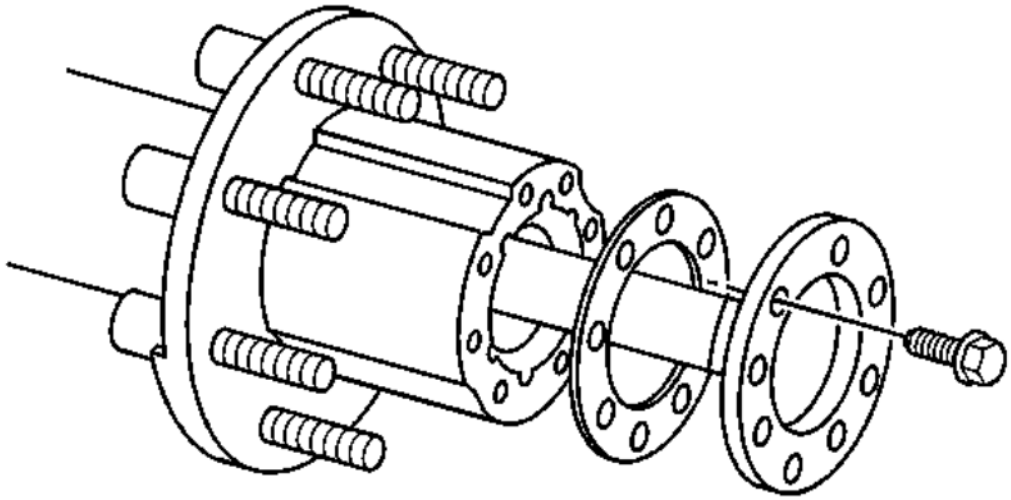


Fig. 86: Axle Flange Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the flange bolts.
2. Lightly tap the axle shaft with a soft-faced hammer in order to loosen the shaft.
3. Grip the rib on the axle shaft flange with a locking pliers. Twist the axle shaft flange in order to start the axle shaft removal.
4. Remove the axle shaft from the tube.
5. Remove the gasket.
6. Clean the axle shaft flange and the outside face of the hub assembly.

Installation Procedure

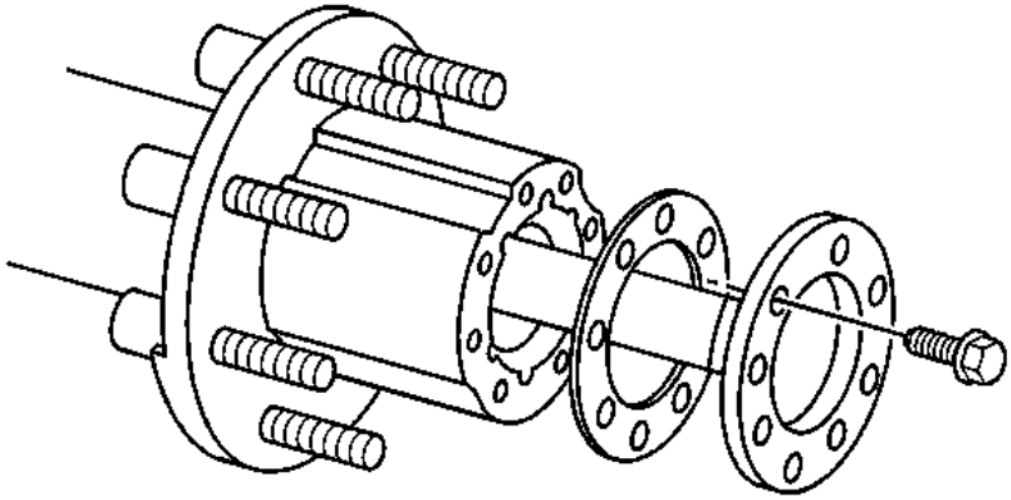


Fig. 87: Axle Flange Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the gasket onto the axle shaft.
2. Install the gasket and the axle shaft into the axle tube.
    1. Ensure the shaft splines mesh into the differential side gear.
    2. Align the holes in the axle flange and the gasket with the holes in the hub.

NOTE: Refer to Fastener Notice .

3. Install the axle flange bolts.

Tighten:

- For the 10.5 inch axle, tighten the rear axle flange bolts to 156 N.m (115 lb ft).
- For the 11.5 inch axle, tighten the rear axle flange bolts to 185 N.m (136 lb ft).

4. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Rear Axle Lubricant Level Inspection (11.5 Inch Axle)** or **Rear Axle Lubricant Level Inspection (8.6, 9.5 LD Axle)** or **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.

REAR AXLE HUB, BEARING, CUP, AND/OR SEAL REPLACEMENT

Special Tools

- **J 8092** Universal Driver Handle - 3/4 inch - 10
- **J 2222-C** Wheel Bearing Nut Wrench
- **J 24426** Wheel Bearing Race Installer - Outer. See **Special Tools**.
- **J 24427** Wheel Bearing Race Installer - Inner. See **Special Tools**.
- **J 44419** Hub Outer Bearing Race Installer. See **Special Tools**.
- **J 44420** Differential Bearing and Hub Seal Installer. See **Special Tools**.

Removal Procedure

IMPORTANT: The wheel hub seal must be replaced anytime the wheel hub assembly is removed from the axle housing.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the brake caliper bracket. It is not necessary to remove the brake caliper from the bracket. Refer to **Rear Brake Caliper Bracket Replacement (JH6, JH7)** or **Rear Brake Caliper Bracket Replacement (JD9)** .
4. Remove the axle shaft. Refer to **Rear Axle Shaft and/or Gasket Replacement**.

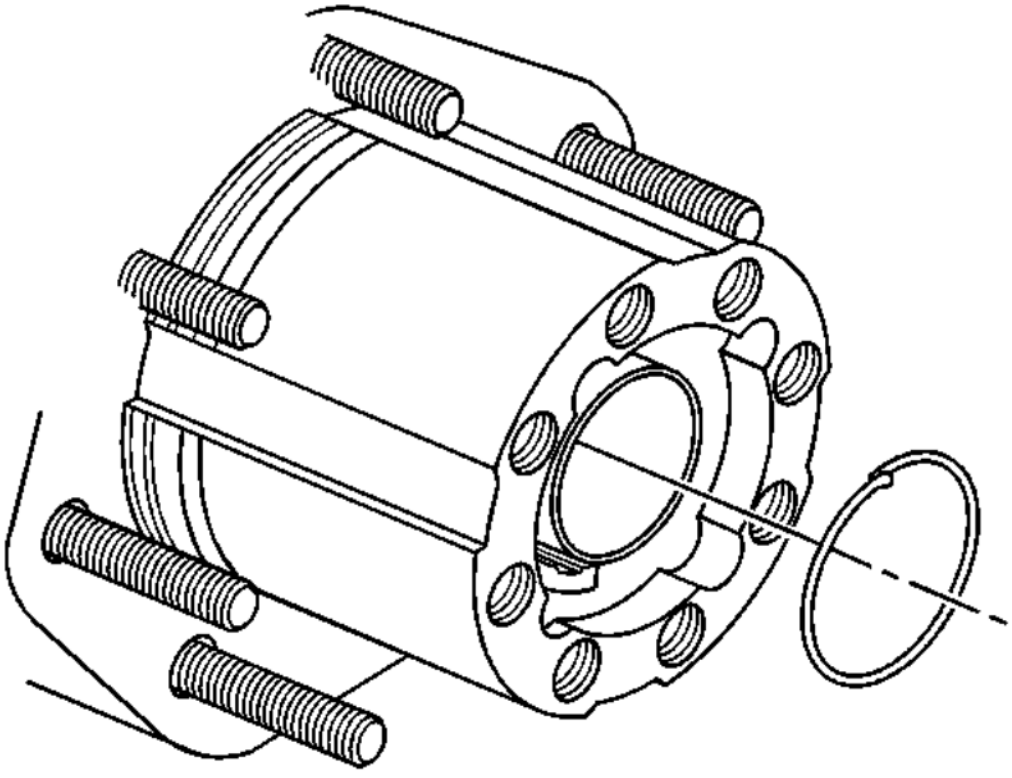


Fig. 88: Axle Nut Retaining Ring
Courtesy of GENERAL MOTORS CORP.

5. Remove the axle nut retaining ring.

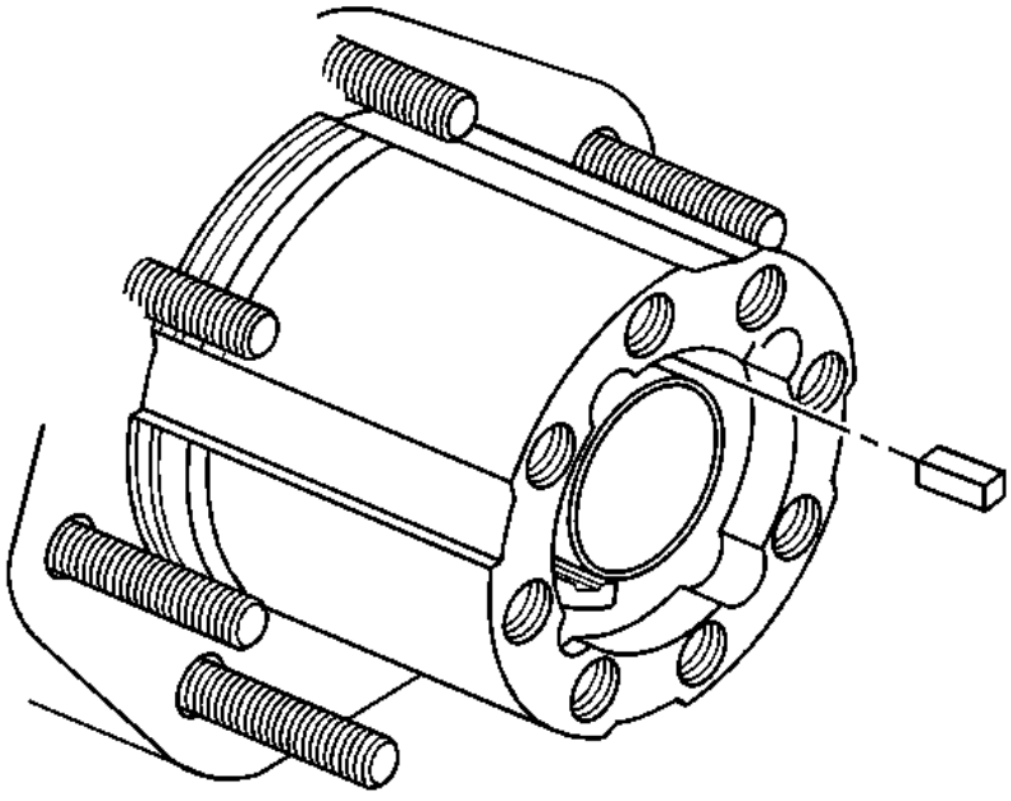


Fig. 89: Adjuster Nut Lock Key
Courtesy of GENERAL MOTORS CORP.

6. Remove the key.

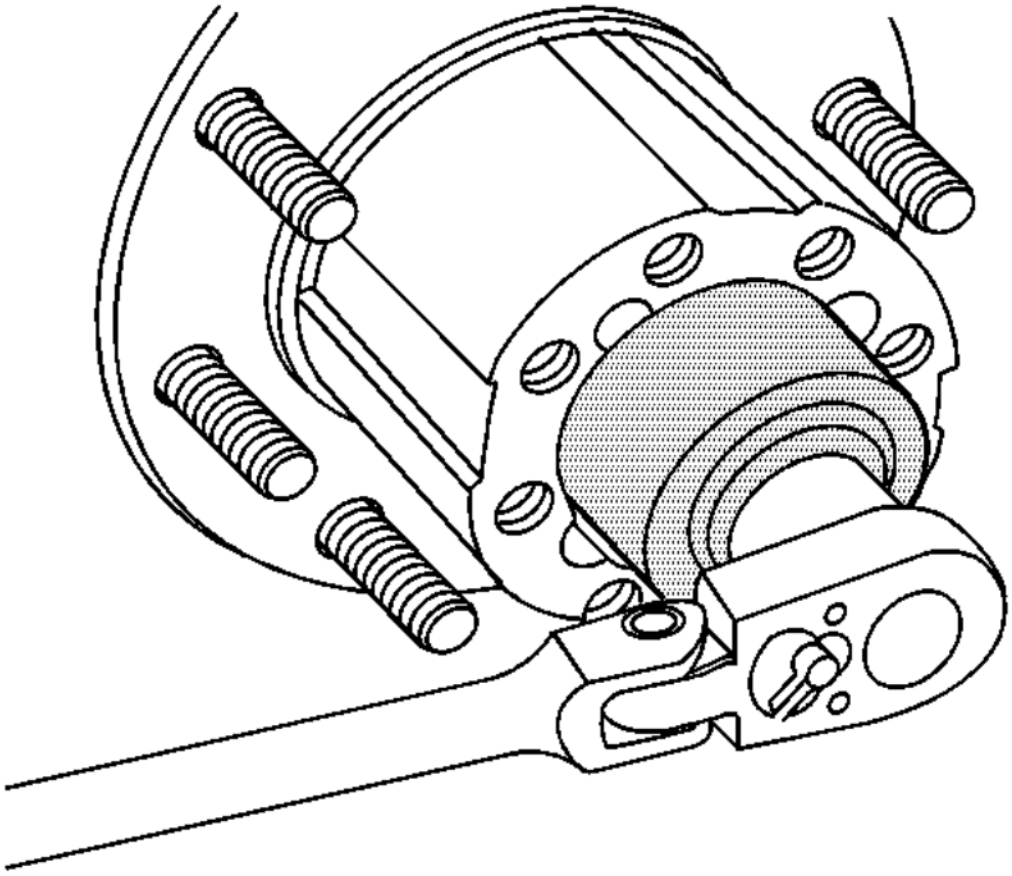


Fig. 90: Adjusting Nut & J 2222-C
Courtesy of GENERAL MOTORS CORP.

7. Remove the adjusting nut using the **J 2222-C** .

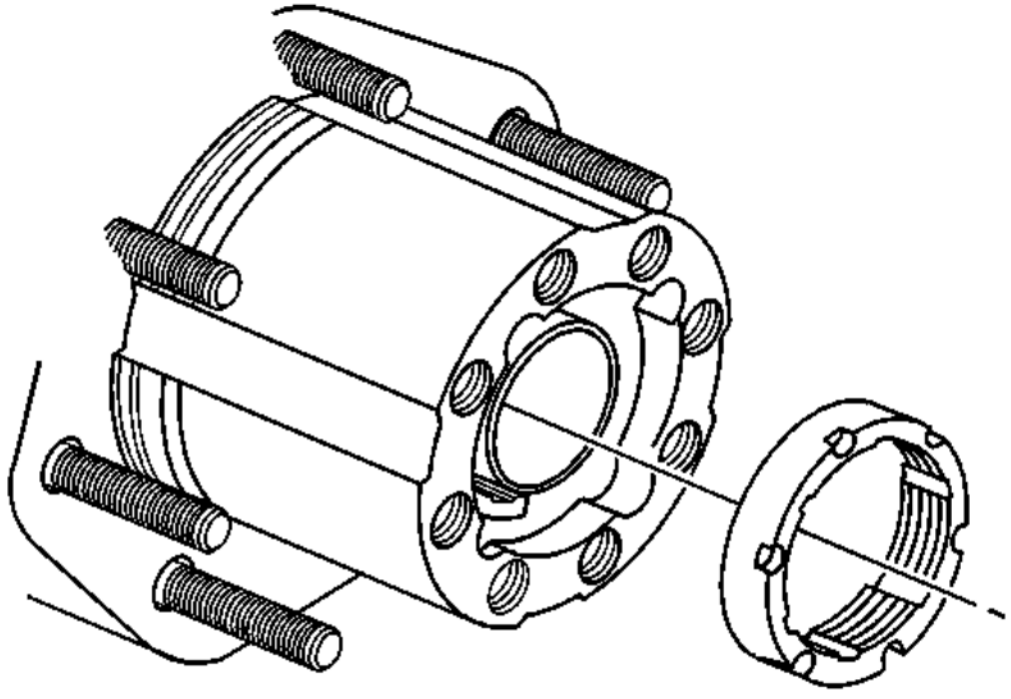


Fig. 91: Adjusting Adjusting Nut
Courtesy of GENERAL MOTORS CORP.

8. Remove the adjusting nut.

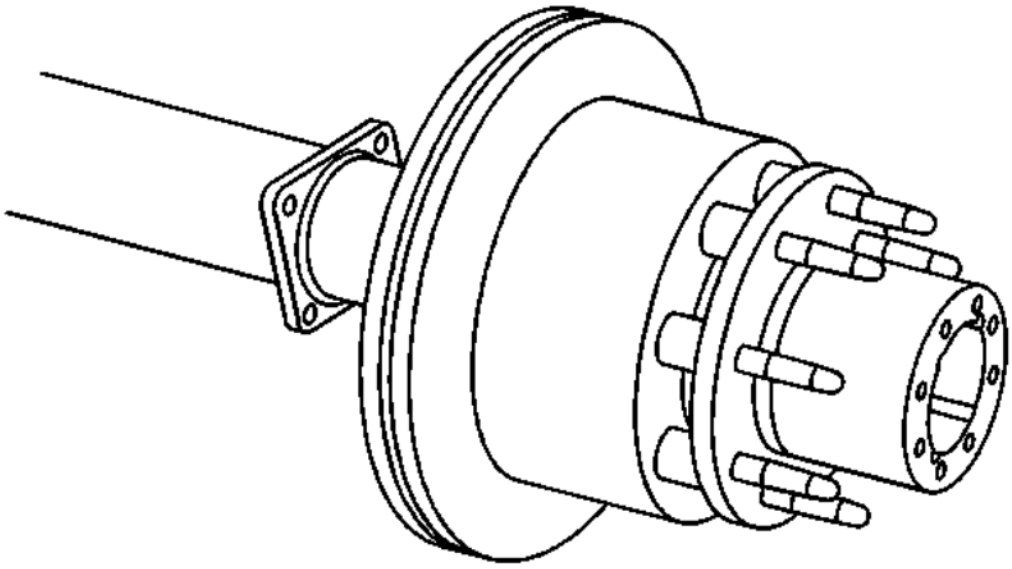


Fig. 92: Wheel Hub & Axle Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the oil seal remains on the axle hub, remove the seal using a suitable seal removal tool.

9. Remove the hub from the axle housing.
10. Remove the rotor, if necessary. Refer to **Rear Brake Rotor Replacement (JD9)** or **Rear Brake Rotor Replacement (JH6)** or **Rear Brake Rotor Replacement (JH7)** .
11. Remove the oil seal from the wheel hub using a suitable seal removal tool.

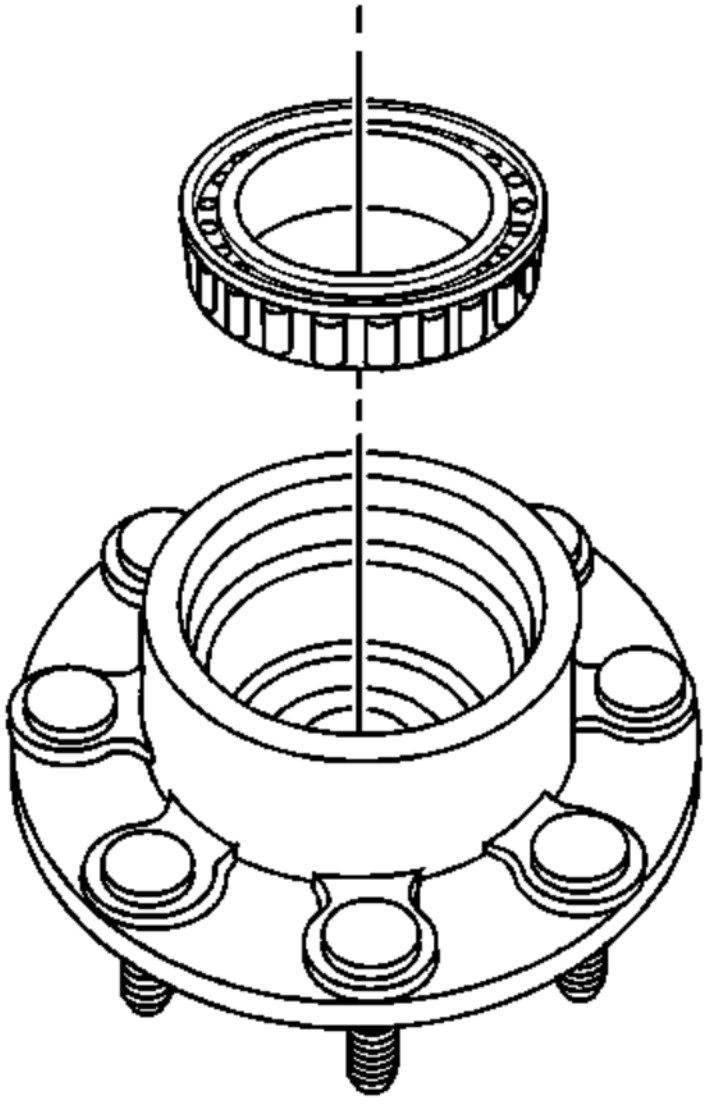


Fig. 93: Inner Hub Bearing
Courtesy of GENERAL MOTORS CORP.

12. Remove the inner hub bearing.

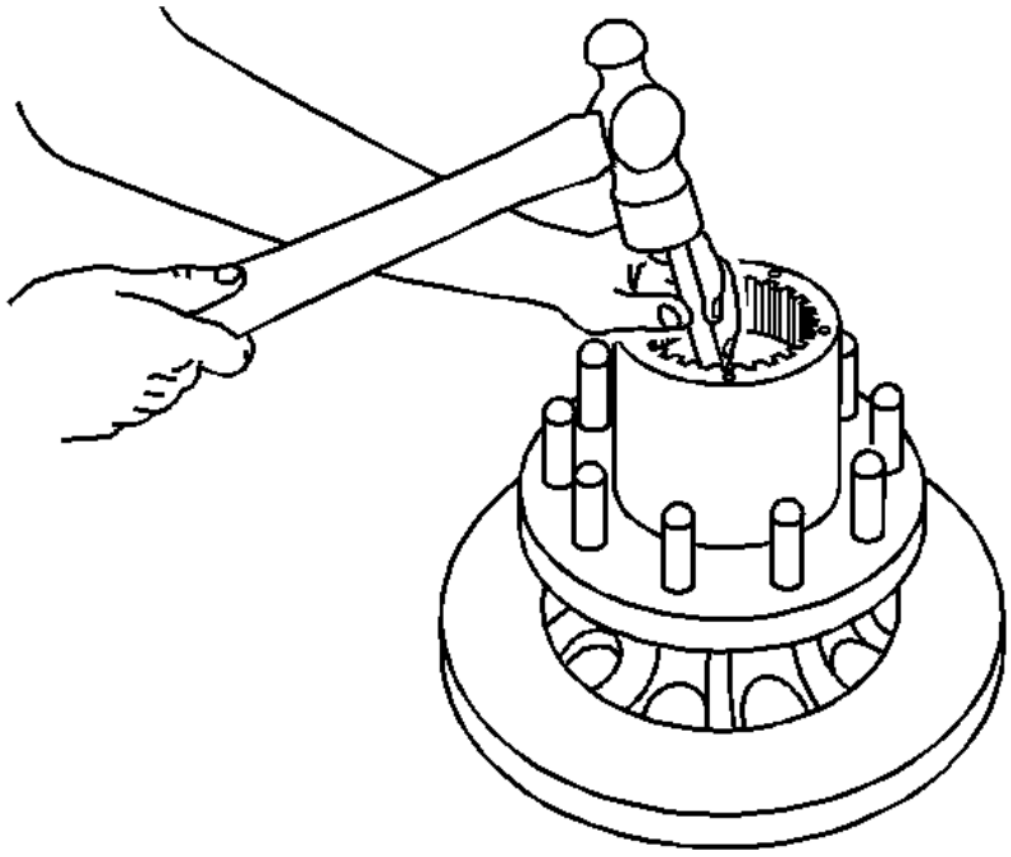


Fig. 94: Removing Inner Hub Bearing Cup
Courtesy of GENERAL MOTORS CORP.

13. Remove the inner hub bearing cup using a brass drift and a hammer.

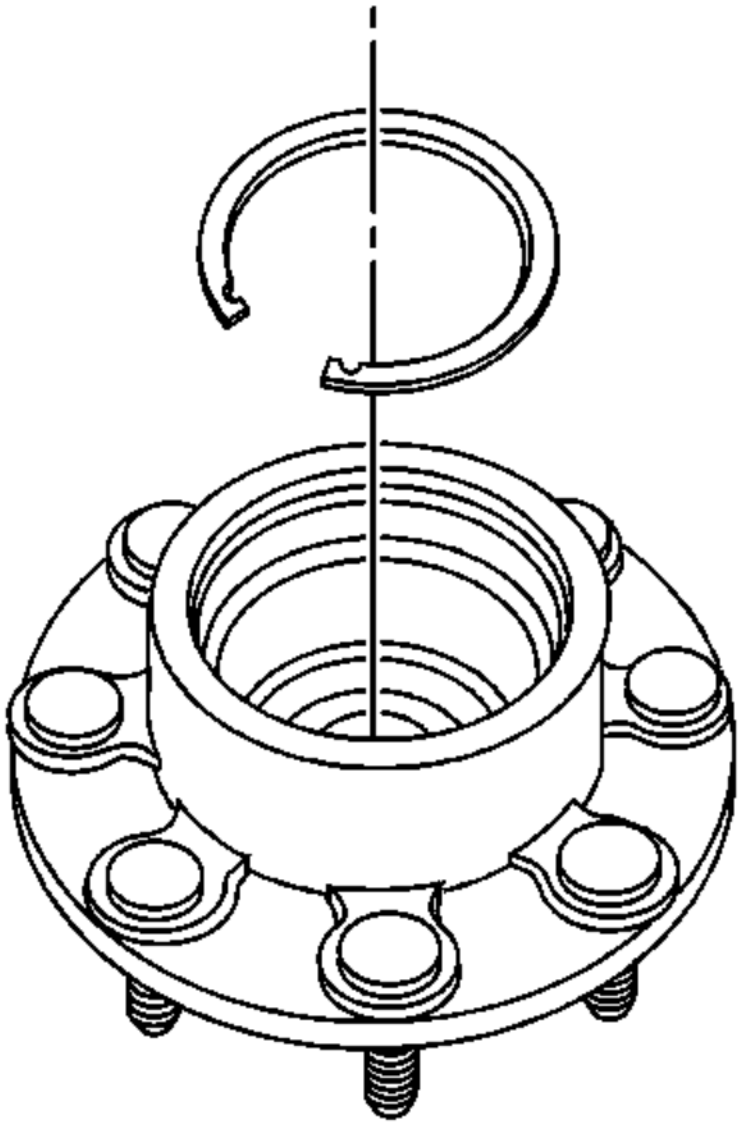


Fig. 95: Wheel Hub Retaining Ring
Courtesy of GENERAL MOTORS CORP.

14. Remove the retaining ring from the wheel hub.

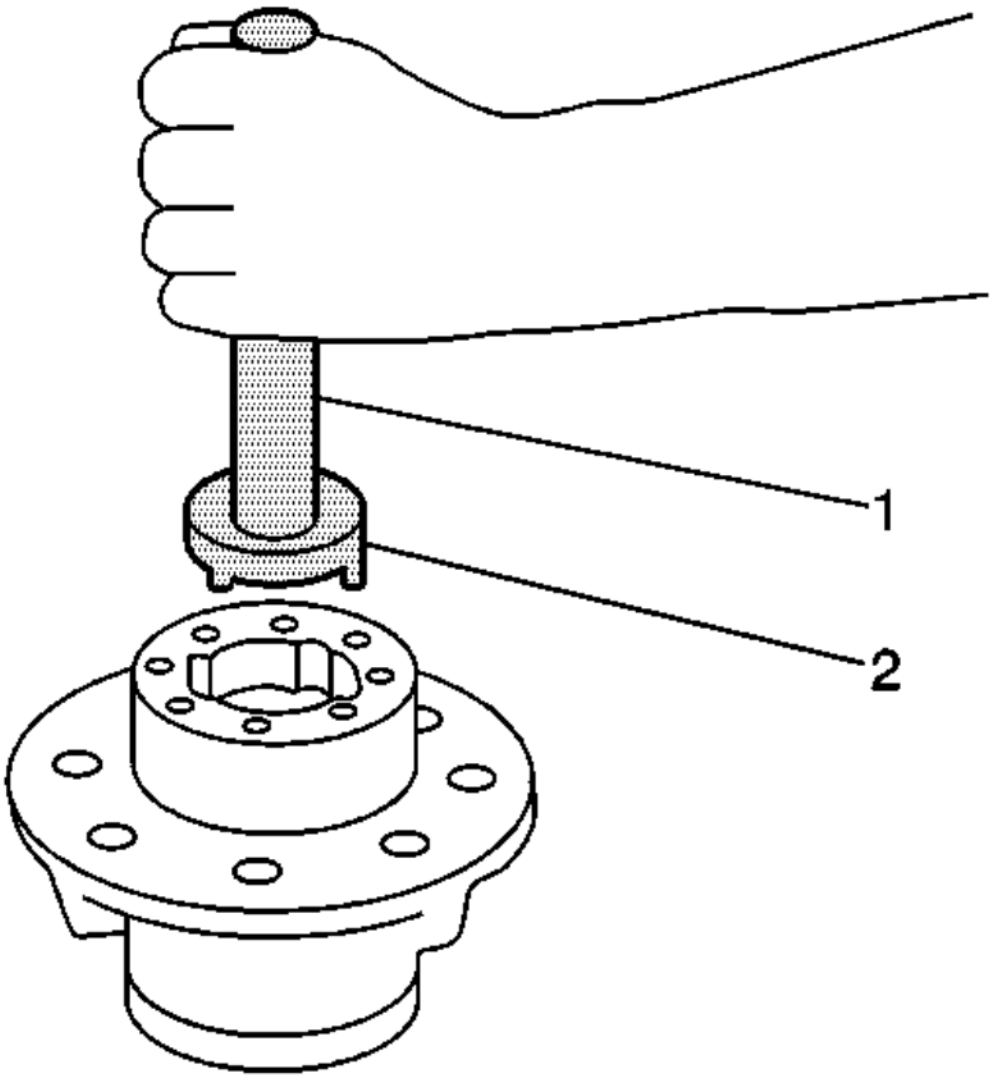


Fig. 96: Outer Hub Bearing & Bearing Cup
Courtesy of GENERAL MOTORS CORP.

15. Remove the outer hub bearing and bearing cup using the **J 24426** (2) and the **J 8092** (1). See **Special Tools**.

Installation Procedure

1. Lubricate the following with a light coat of high melting point EP bearing lubricant:
   - The outer wheel bearing
   - The inner wheel bearing
   - The outer wheel bearing cup
   - The inner wheel bearing cup
   - The axle hub spindle

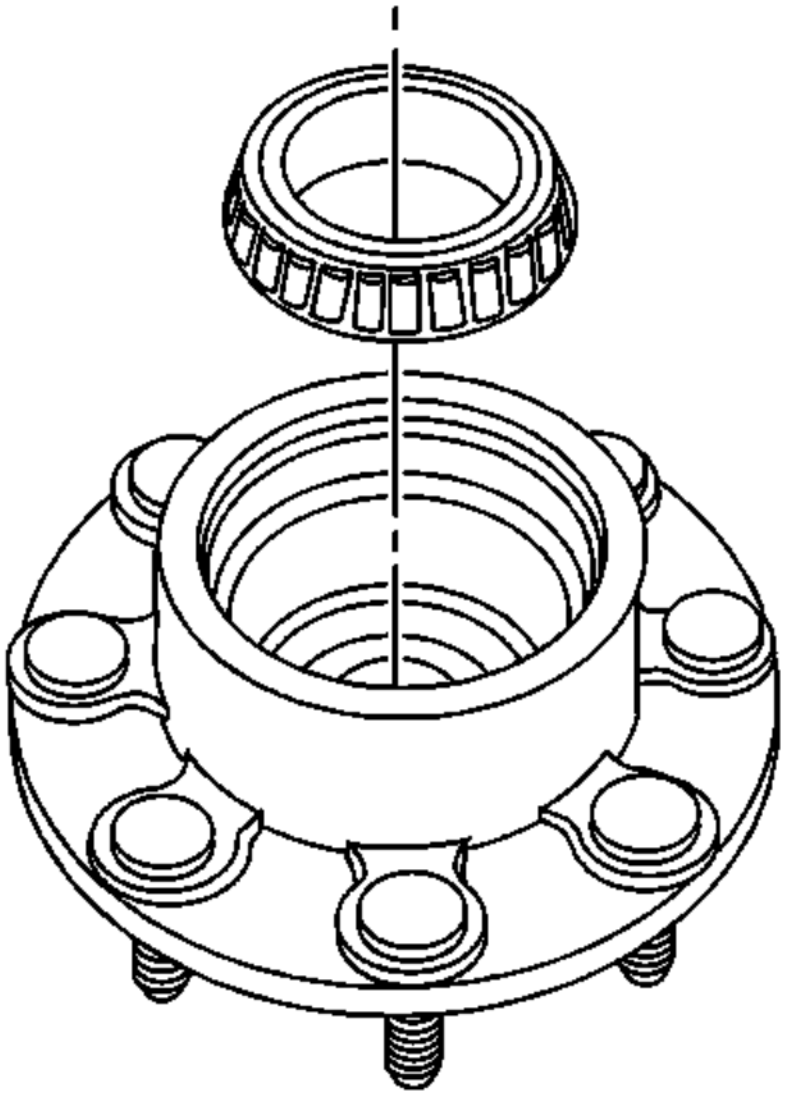


Fig. 97: Wheel Hub Outer Bearing
Courtesy of GENERAL MOTORS CORP.

2. Install the outer bearing into the wheel hub.

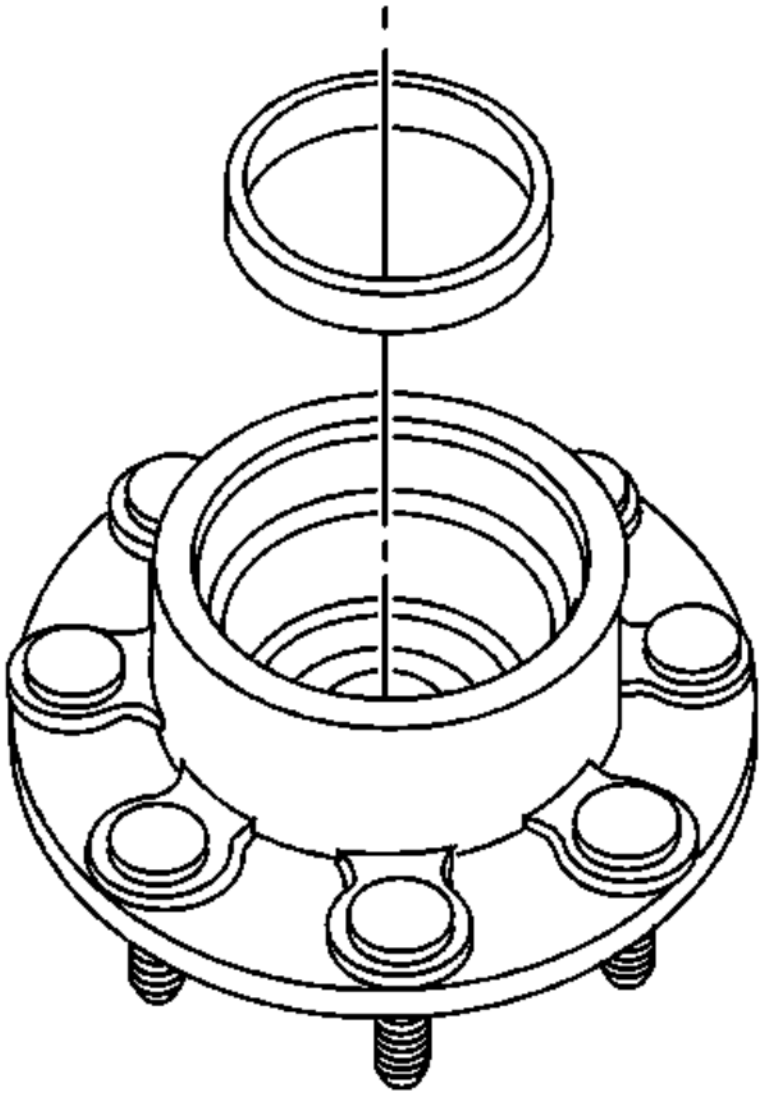


Fig. 98: Wheel Hub Outer Bearing Cup
Courtesy of GENERAL MOTORS CORP.

3. Install the outer bearing cup into the wheel hub.

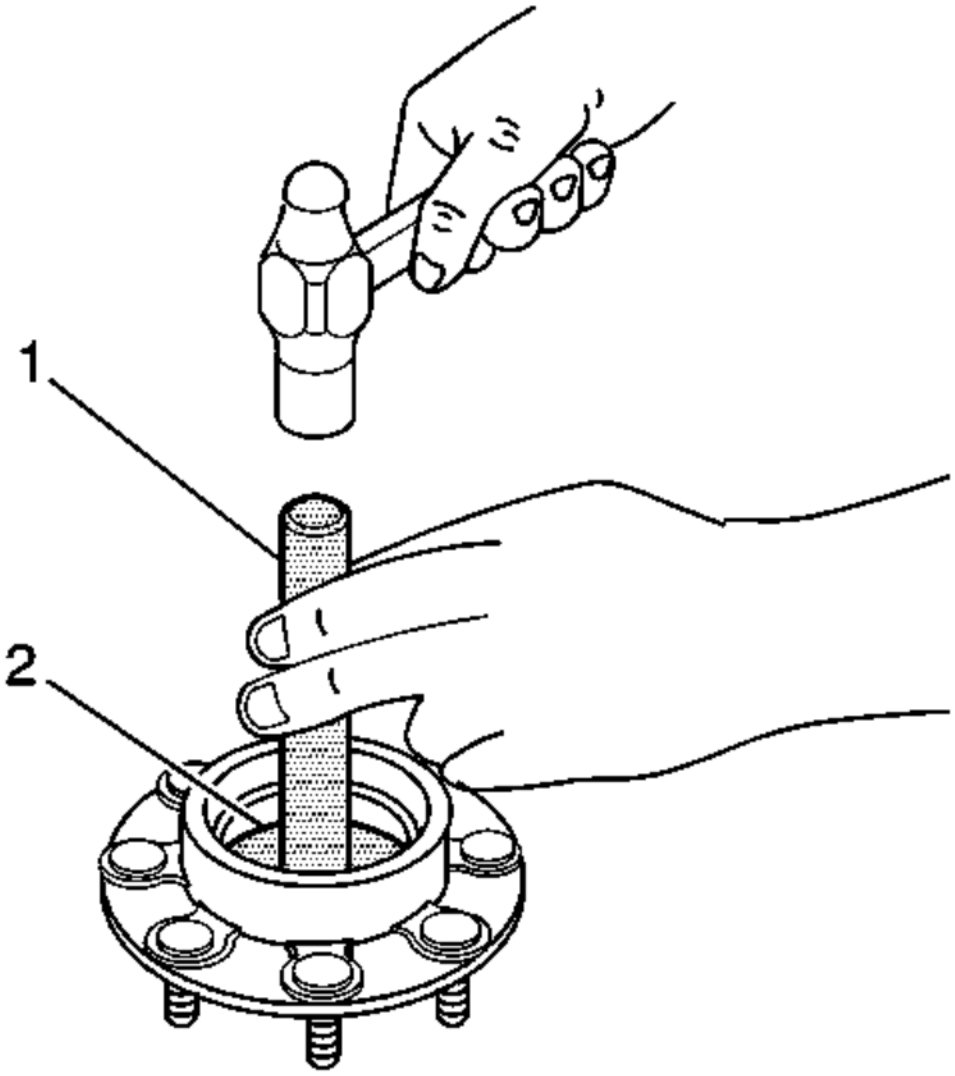


Fig. 99: Driving Bearing Cup Into Wheel Hub
Courtesy of GENERAL MOTORS CORP.

4. Drive the outer bearing cup into the wheel hub using the **J 44419** (2) and the **J 8092** (1). See **Special Tools**.

   Drive the outer bearing cup into the wheel hub until it is just past the retaining ring groove. Do not bottom out the bearing assembly in the bore.

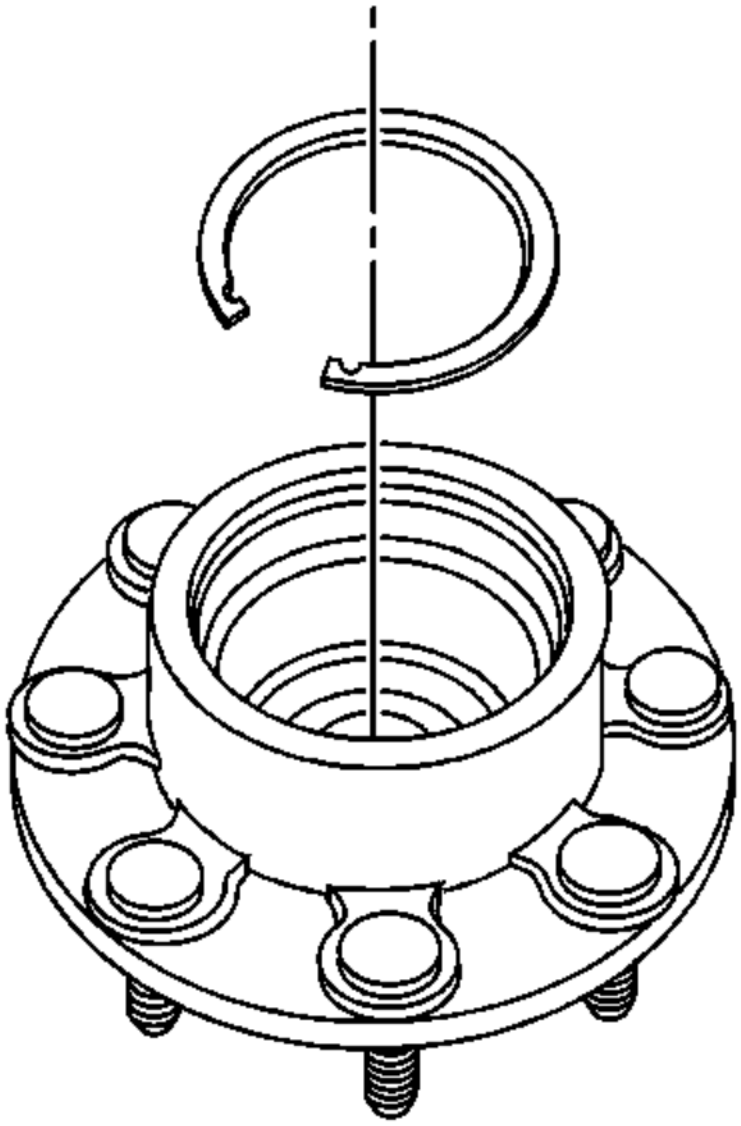


Fig. 100: Wheel Hub Retaining Ring
Courtesy of GENERAL MOTORS CORP.

5. Install the retaining ring into the groove. Make sure the retaining ring is fully and evenly seated in the groove.

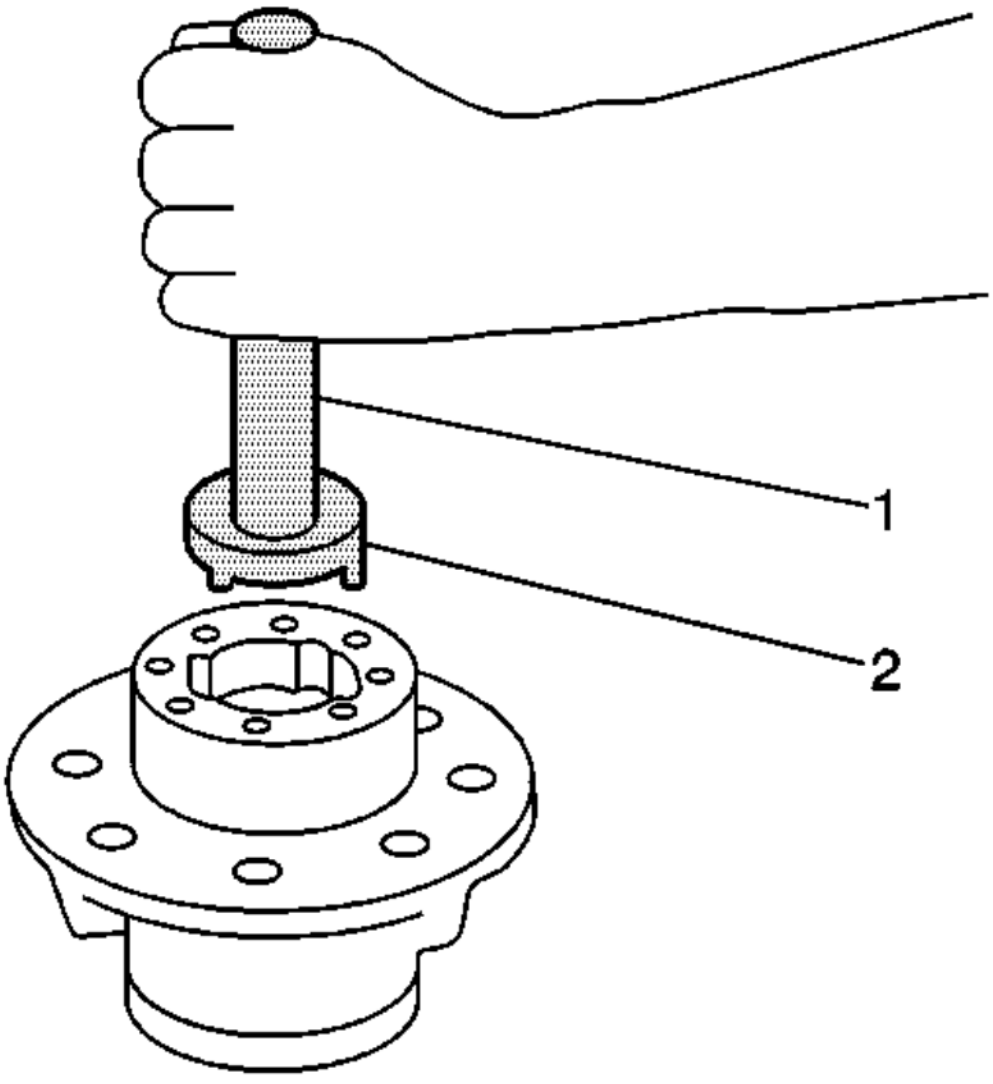


Fig. 101: Outer Hub Bearing & Bearing Cup
Courtesy of GENERAL MOTORS CORP.

6. Turn the wheel hub over and seat the outer bearing assembly against the retaining ring using the **J 24426** (2) and the **J 8092** (1). See **Special Tools**.
7. Ensure that the outer bearing assembly rotates freely in the hub.

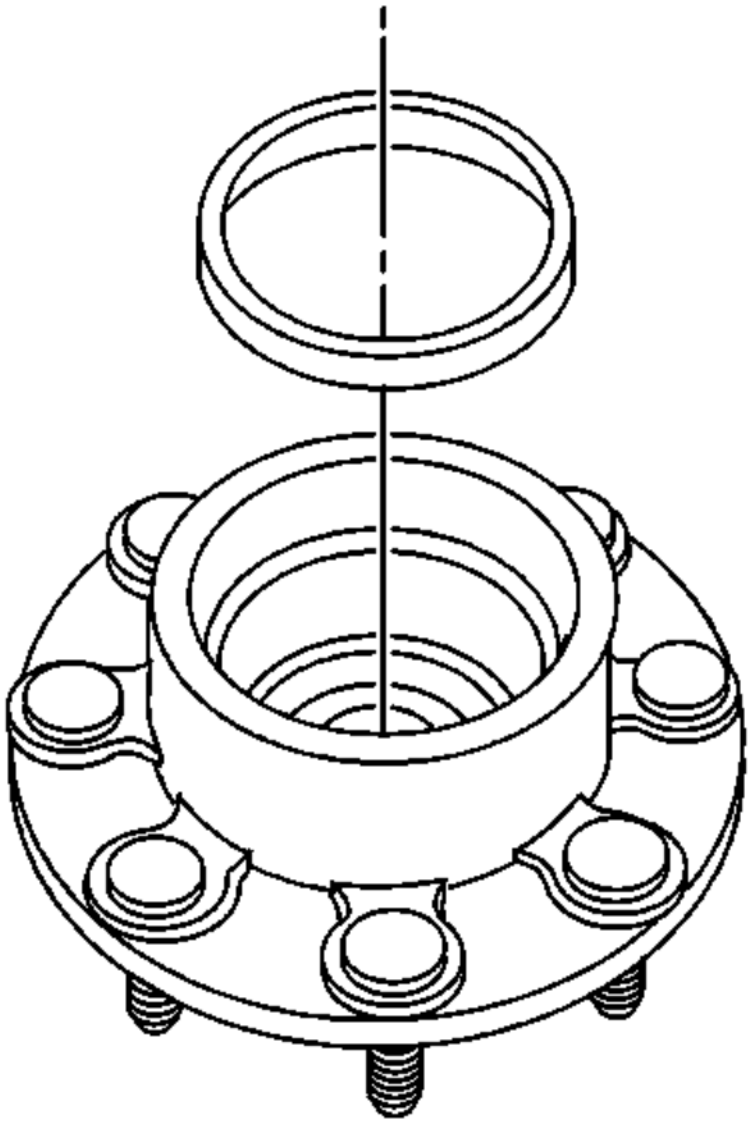


Fig. 102: Wheel Hub Inner Bearing Cup
Courtesy of GENERAL MOTORS CORP.

8. Turn the wheel hub over and install the inner bearing cup.

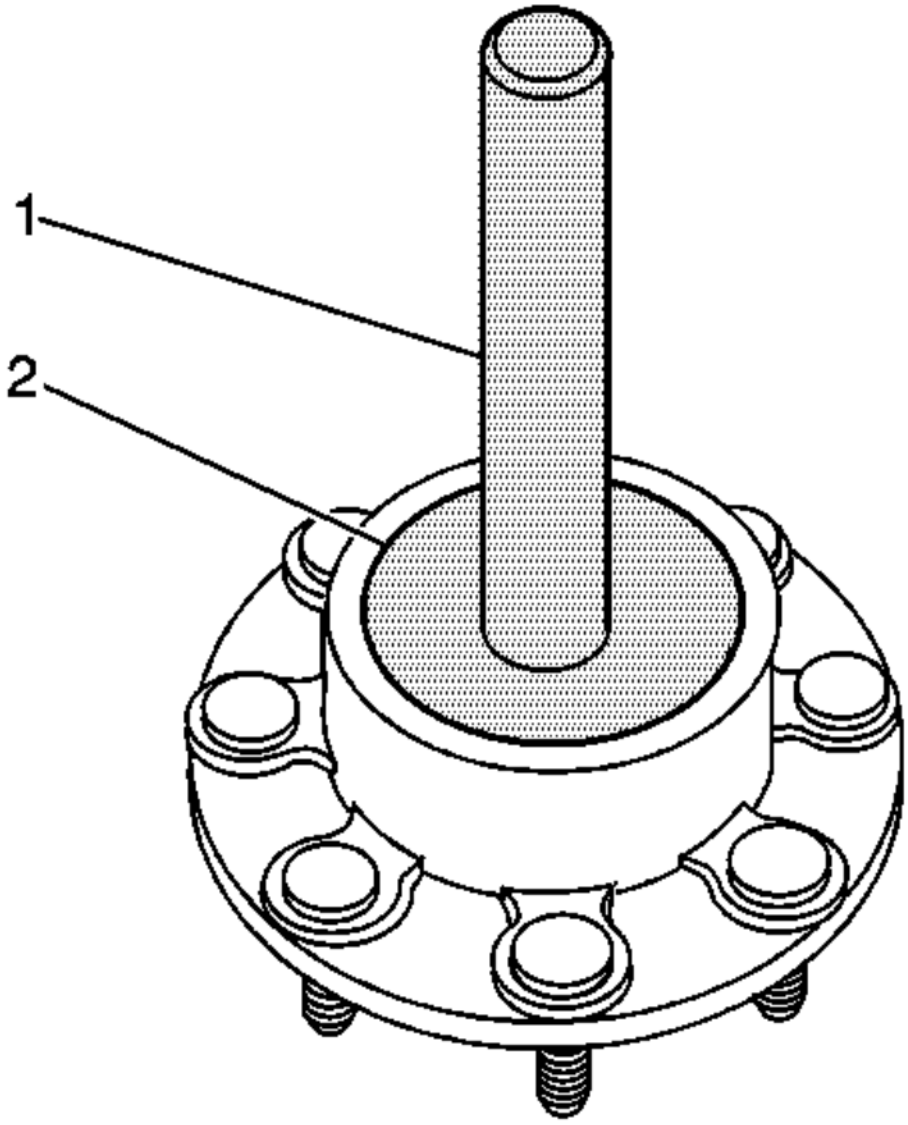


Fig. 103: Driving Inner Bearing Cup Into Wheel Hub
Courtesy of GENERAL MOTORS CORP.

9. Drive the inner bearing cup into the wheel hub using the **J 24427** (2) and the **J 8092** (1). See **Special Tools**.

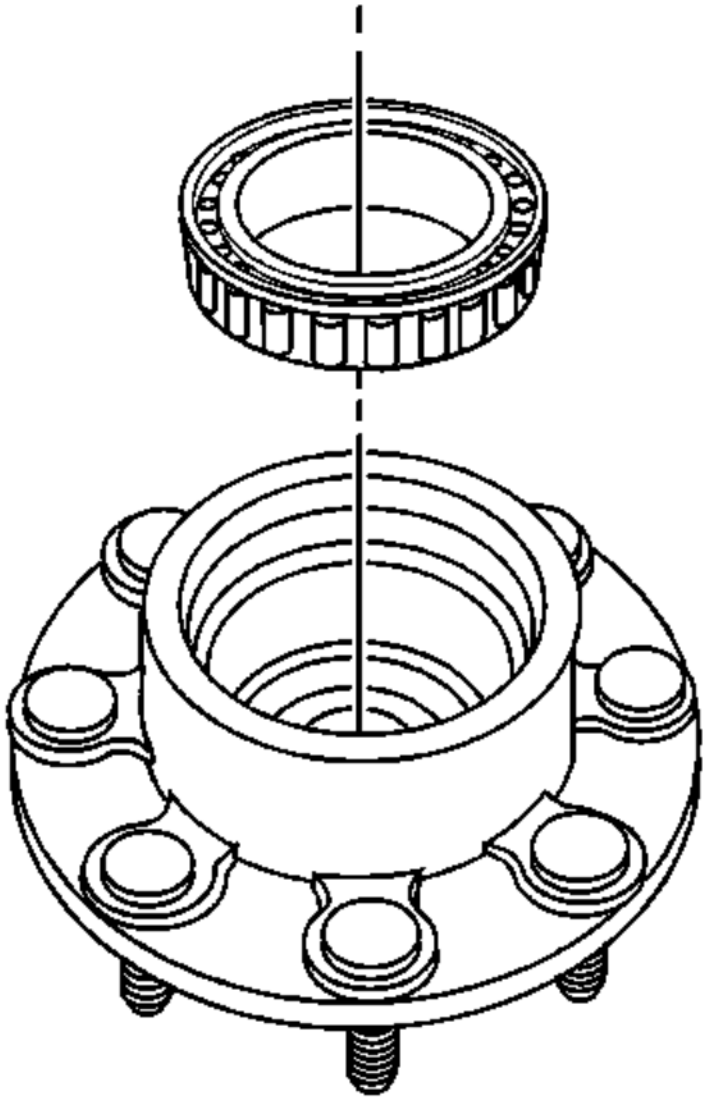


Fig. 104: Inner Hub Bearing
Courtesy of GENERAL MOTORS CORP.

10. Install the inner bearing.

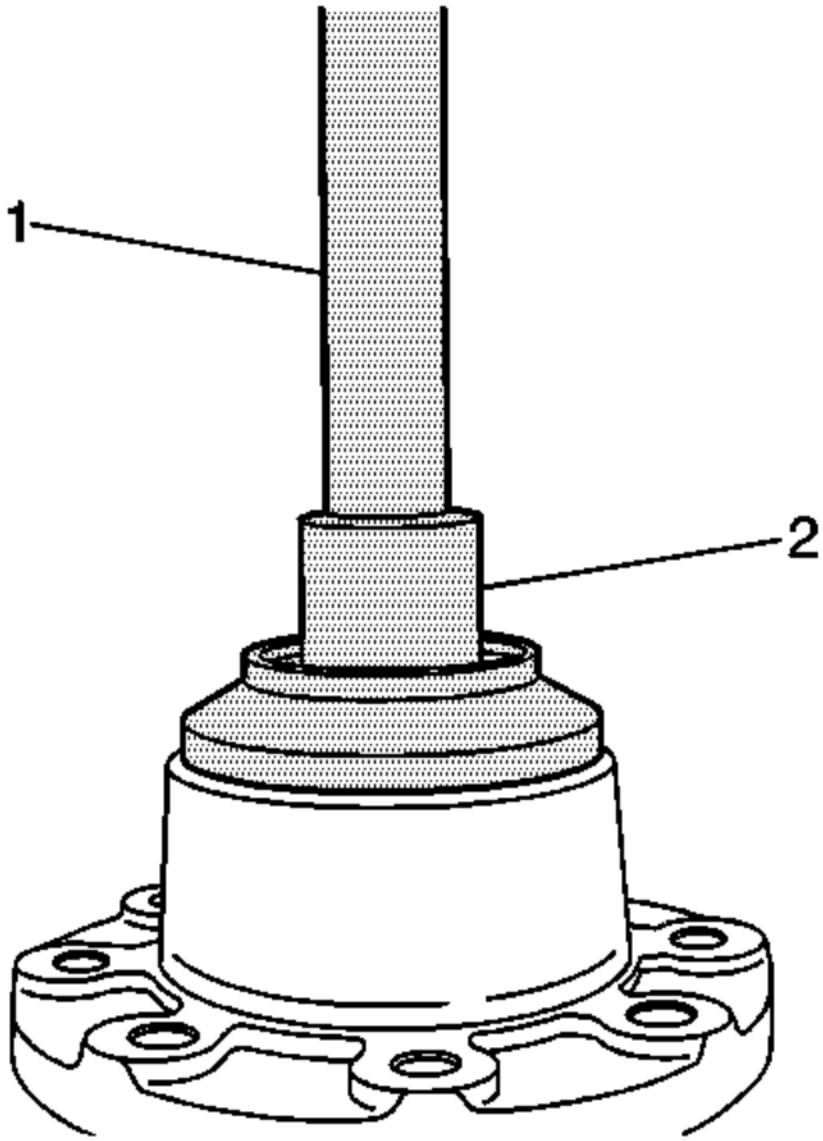


Fig. 105: J 8092 & J 44420
Courtesy of GENERAL MOTORS CORP.

11. Using the **J 44420** (2) and the **J 8092** (1), install the new oil seal. Ensure the seal is fully seated in the hub bore.
12. Install the rotor, if necessary. Refer to **Rear Brake Rotor Replacement (JD9)** or **Rear**

Brake Rotor Replacement (JH6) or **Rear Brake Rotor Replacement (JH7)** .

13. Apply a light coat of high melting point EP bearing lubricant to the axle housing spindle.

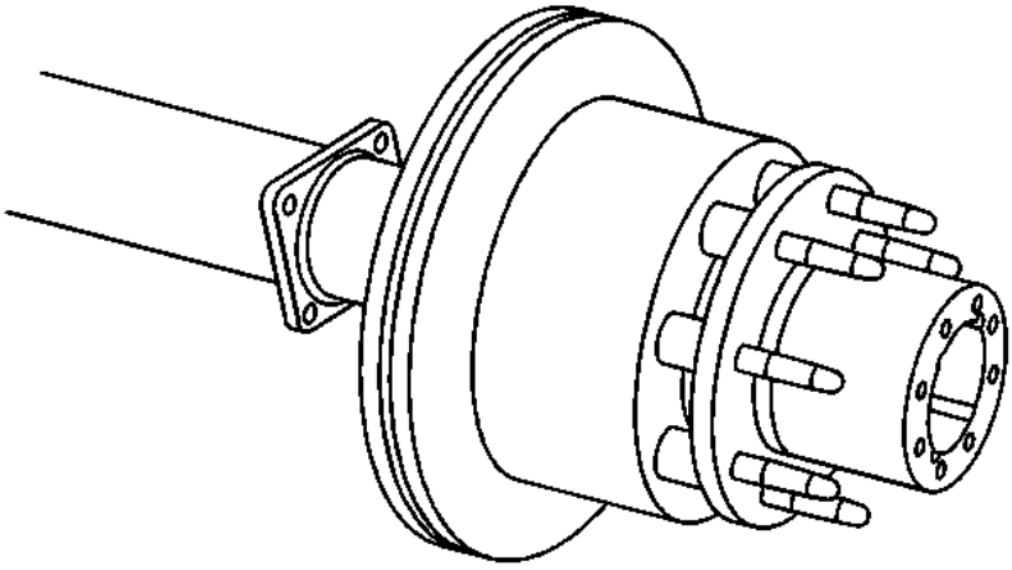


Fig. 106: Wheel Hub & Axle Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the wheel hub assembly does not fully seat itself onto the axle shaft spindle and is removed, the wheel hub seal must be replaced.

14. Install the wheel hub to the axle housing.

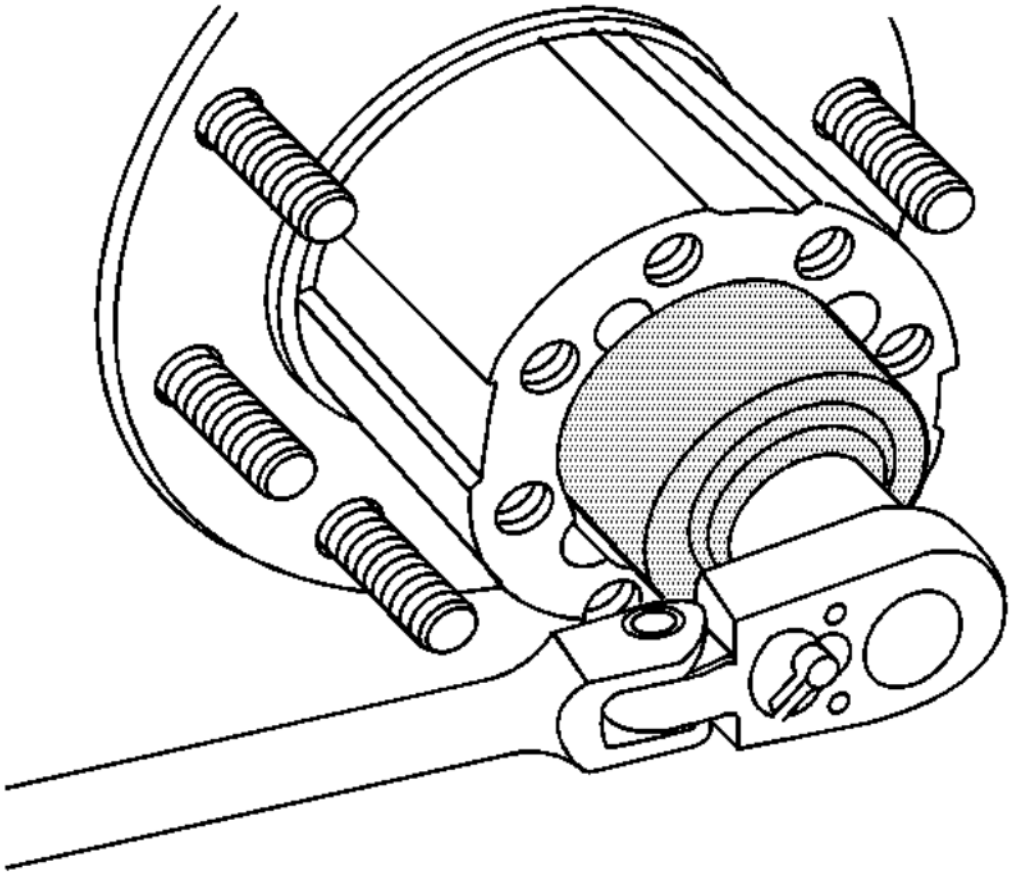


Fig. 107: Adjusting Nut & J 2222-C
Courtesy of GENERAL MOTORS CORP.

15. Install the adjusting nut to the hub using the **J 2222-C** .
16. Adjust the wheel bearings. Refer to **Wheel Bearing Adjustment**.
17. Install the axle shaft. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
18. Install the brake caliper bracket. Refer to **Rear Brake Caliper Bracket Replacement (JH6, JH7)** or **Rear Brake Caliper Bracket Replacement (JD9)** .
19. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
20. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Rear Axle Lubricant Level Inspection (11.5 Inch Axle)** or **Rear Axle Lubricant Level Inspection (8.6, 9.5 LD Axle)** or **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.

21. Lower the vehicle.

DRIVE PINION FLANGE/YOKE AND/OR OIL SEAL REPLACEMENT (ALL EXCEPT 9.75 INCH INCH AXLE)

Tools Required

- **J 8614-01** Flange/Pulley Holding Tool
- **J 22388** Rear Axle Pinion Oil Seal Installer - Rear (8. See **Special Tools**.6 inch, 9.5 inch axle)
- **J 44414** Rear Axle Pinion Oil Seal Installer (10. See **Special Tools**.5 inch, 11.5 inch axle)

Removal Procedure

IMPORTANT: Observe and mark the positions of all the driveline components, relative to the propeller shaft and the axles, prior to disassembly. These components include the propeller shafts, drive axles, pinion flanges, output shafts, etc. Reassemble all the components in the exact places in which you removed the parts. Follow any specifications, torque values, and any measurements made prior to disassembly.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assemblies (8.6 inch, 9.5 inch axles). Refer to **Tire and Wheel Removal and Installation** .
3. Remove the rear brake calipers (8.6 inch, 9.5 inch axles). Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .
4. Remove the brake rotors (8.6 inch, 9.5 inch axles). Refer to **Rear Brake Rotor Replacement (JD9)** or **Rear Brake Rotor Replacement (JH6)** or **Rear Brake Rotor Replacement (JH7)** .
5. Remove the axle shafts (10.5 inch, 11.5 inch axle). Refer to **Rear Axle Shaft and/or Gasket Replacement**.

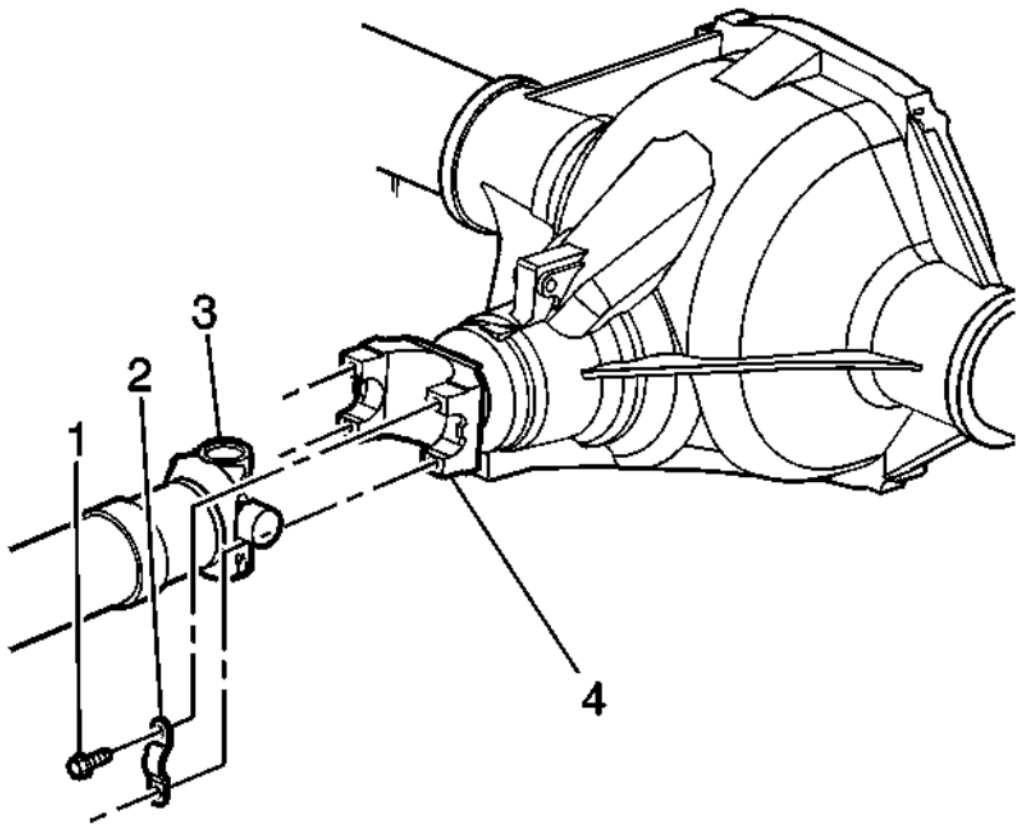


Fig. 108: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

6. Reference mark the rear propeller shaft (3) to the rear axle pinion yoke (4).
7. Disconnect the propeller shaft from the axle.

   Wrap the bearing caps with tape in order to prevent the loss of bearing rollers.

   Support the propeller shaft as necessary.

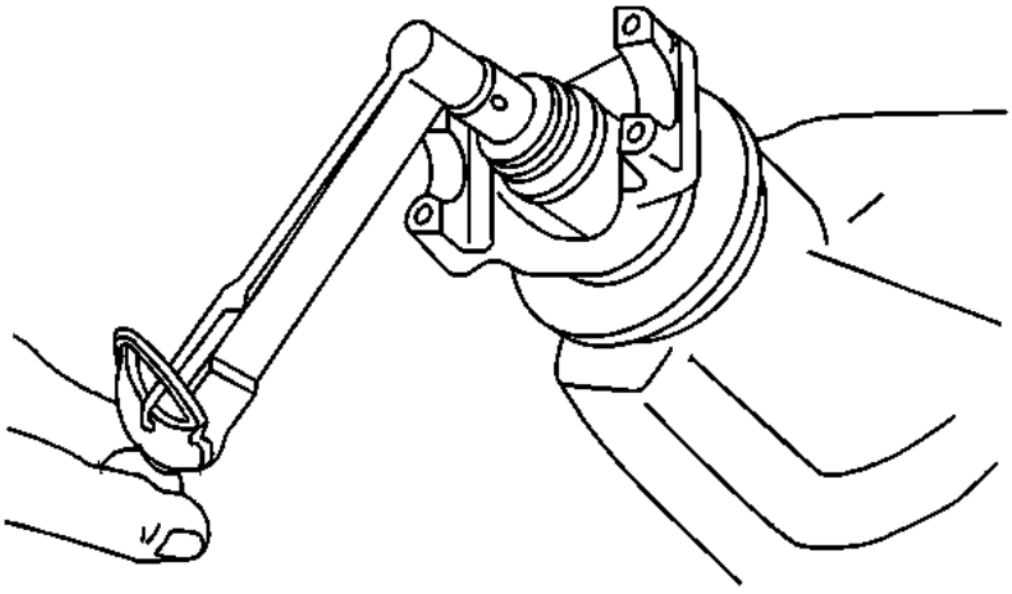


Fig. 109: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

8. Measure the amount of torque required to rotate the pinion. Use an inch-pound torque wrench. Record this measurement for reassembly. This will give the combined preload for the following components:
    - The pinion bearings
    - The pinion pilot bearing (10.5 inch axle)
    - The pinion oil seal
    - The differential case bearings
    - The axle bearings (8.6 inch, 9.5 inch axles)
    - The axle seals (8.6 inch, 9.5 inch axles)

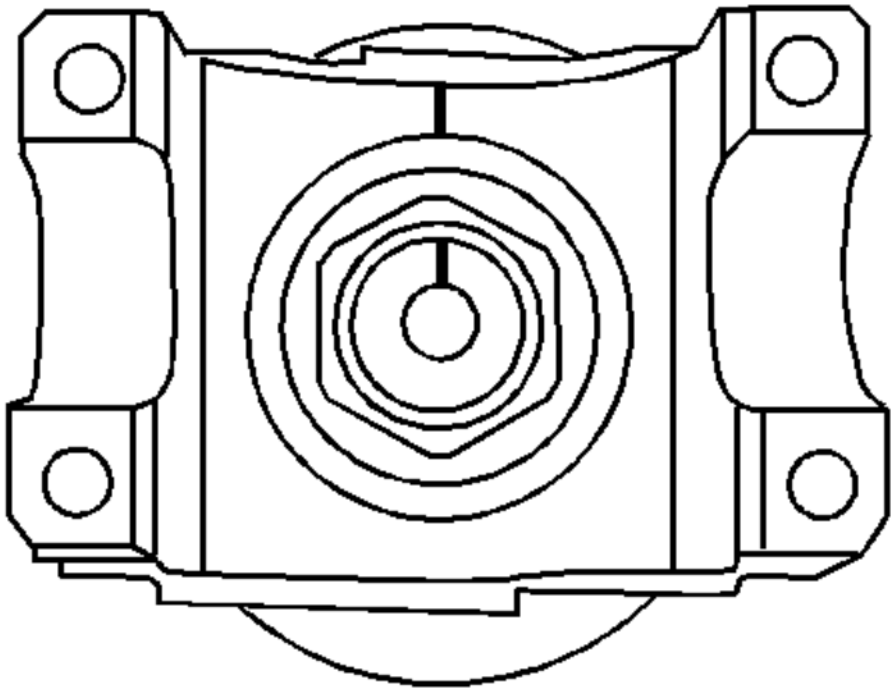


Fig. 110: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

9. Place an alignment mark between the pinion and the pinion yoke.

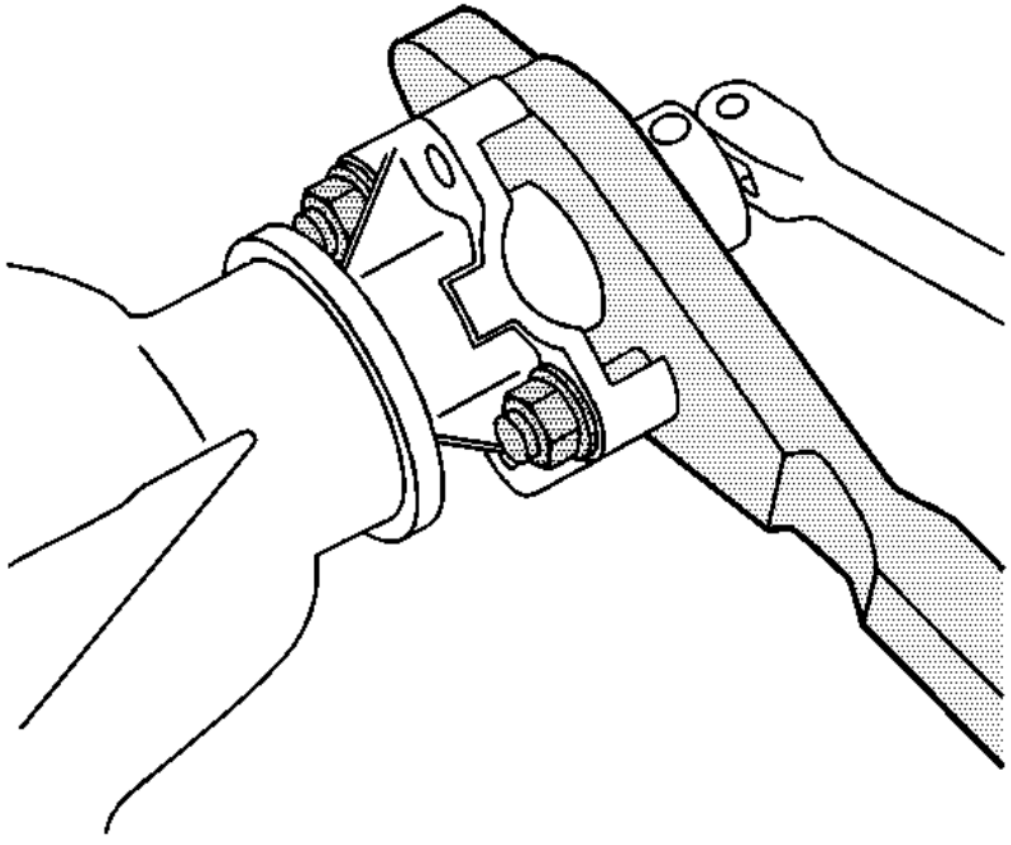


Fig. 111: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

10. Install the **J 8614-01** as shown.
11. Remove the pinion nut while holding the **J 8614-01** .
12. Remove the washer.

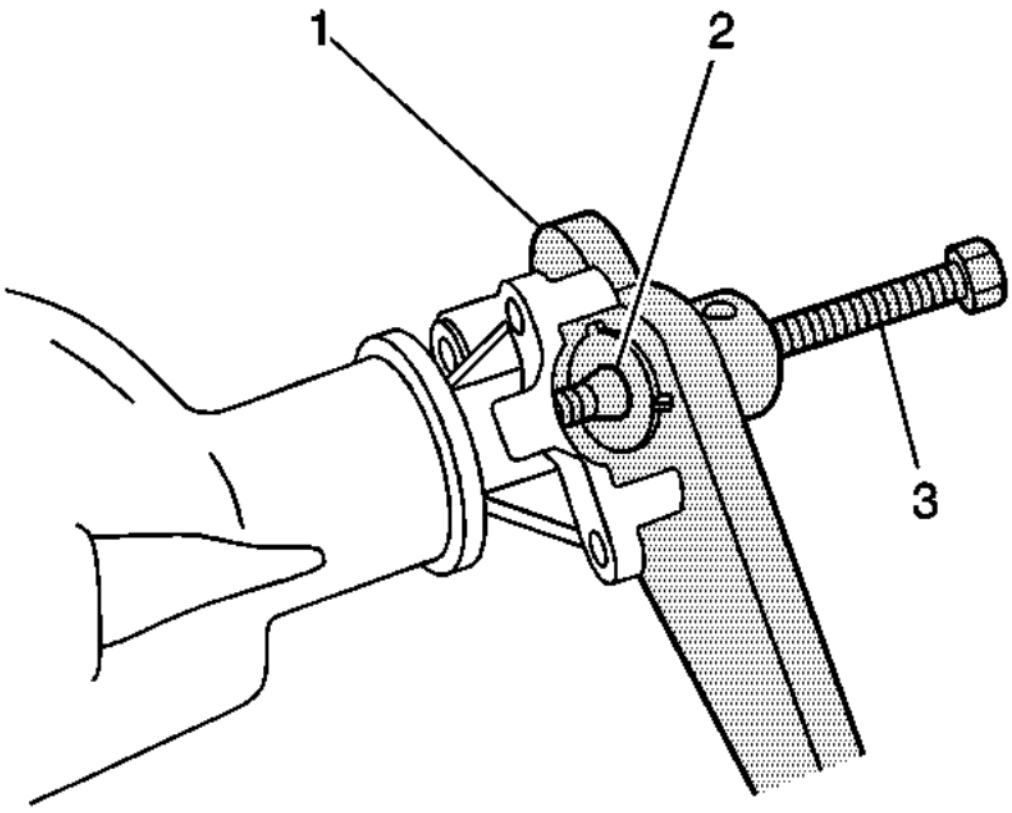


Fig. 112: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

13. Install the J 8614-2 (2) and the J 8614-3 (3) into the **J 8614-01** (1) as shown.
14. Remove the pinion yoke by turning the J 8614-3 (3) clockwise while holding the **J 8614-01** (1).

    Use a container in order to retrieve the lubricant.

15. Remove the pinion oil seal. Use a suitable seal removal tool. Do not damage the housing.

Installation Procedure

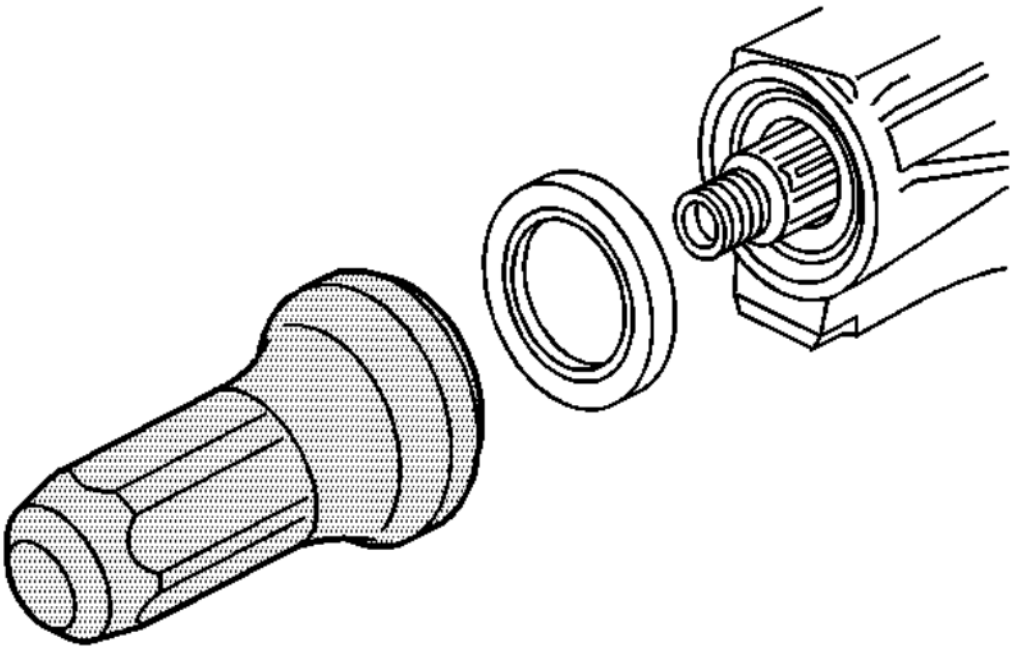


Fig. 113: Installing Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

1. Install a new pinion oil seal using the **J 22388** (8. See **Special Tools**.6 inch, 9.5 inch axles) or the **J 44414** (10. See **Special Tools**.5 inch, 11.5 inch axle).
2. Apply sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the splines of the pinion yoke.
3. Install the pinion yoke.

   Align the marks made during removal.

NOTE: Refer to Pinion Flange/Yoke Installation Notice .

4. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer until a few pinion shaft threads show through the yoke.
5. Install the washer and a new pinion nut.

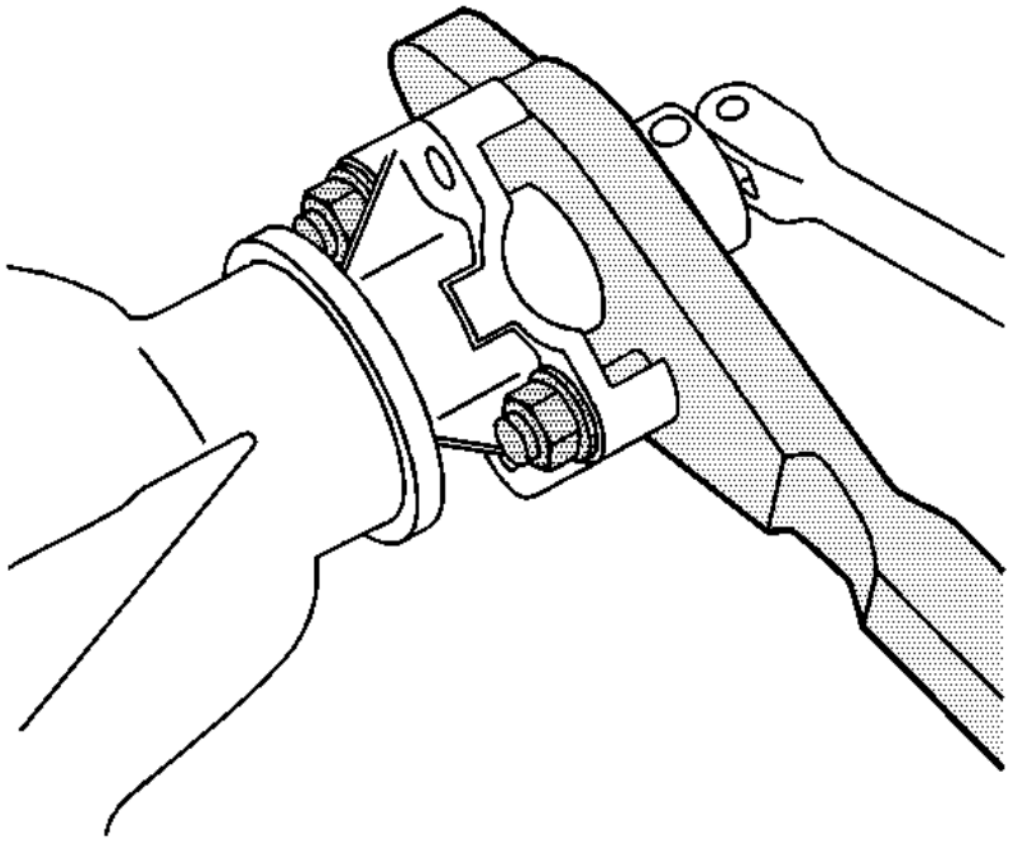


Fig. 114: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

6. Install the **J 8614-01** onto the pinion yoke as shown.

NOTE: Refer to Fastener Notice .

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

7. Tighten the pinion nut while holding the **J 8614-01** .

Tighten: Tighten the nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

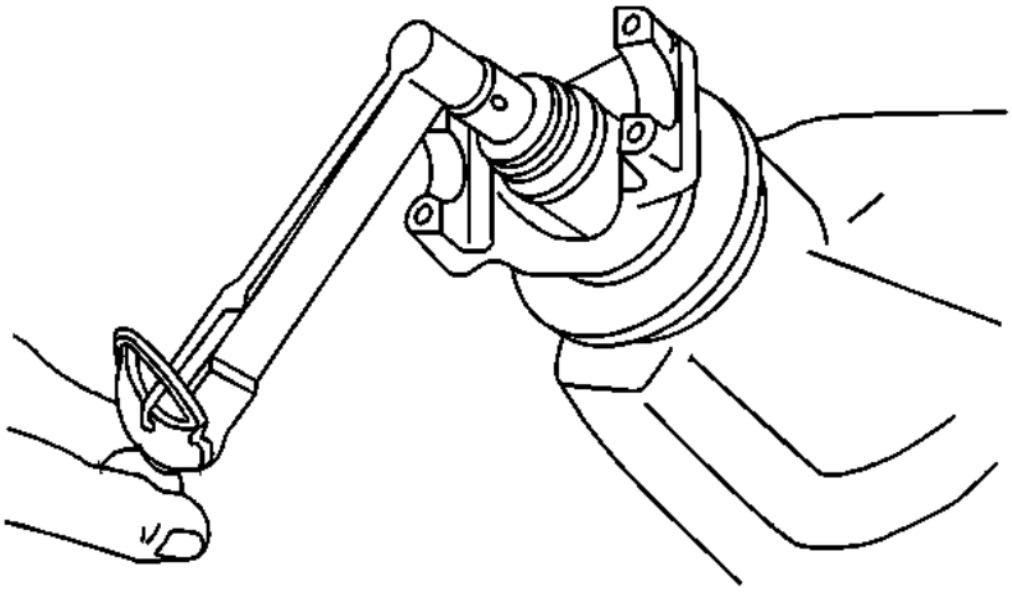


Fig. 115: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

8. Measure the rotating torque of the pinion. Compare this measurement with the rotating torque recorded during removal.

   Tighten: Tighten the nut in small increments, as needed, until the rotating torque is 0.40-0.57 N.m (3- 5 lb in) greater than the rotating torque recorded during removal.

9. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.

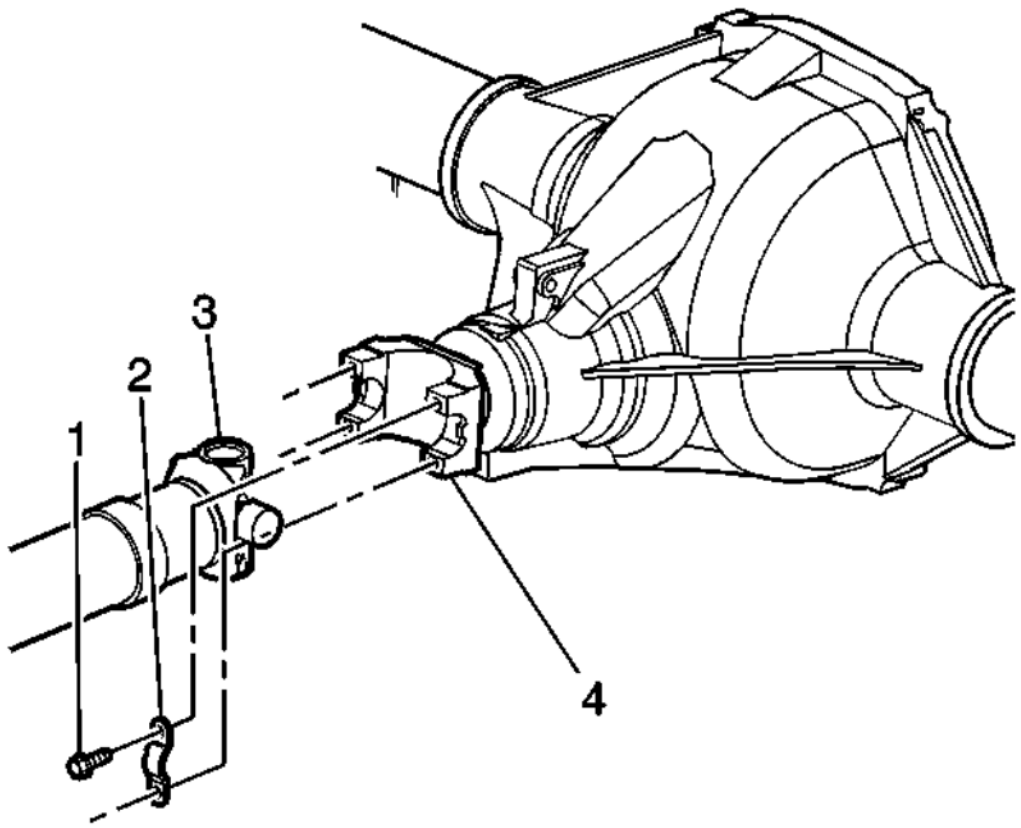


Fig. 116: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

10. Install the propeller shaft (3) to the pinion yoke (4).

    Align the reference marks made during removal.

11. Install the propeller shaft yoke retaining clamps and the bolts.

    Tighten: Tighten the propeller shaft yoke retaining clamp bolts to 25 N.m (18 lb ft).

12. Install the axle shafts (10.5 inch, 11.5 inch axle). Refer to **Rear Axle Shaft and/or Gasket Replacement**.
13. Install the brake rotors (8.6 inch, 9.5 inch axles). Refer to **Rear Brake Rotor Replacement (JD9)** or **Rear Brake Rotor Replacement (JH6)** or **Rear Brake Rotor**

Replacement (JH7) .

14. Install the brake calipers (8.6 inch, 9.5 inch axles). Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .
15. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
16. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Rear Axle Lubricant Level Inspection (11.5 Inch Axle)** or **Rear Axle Lubricant Level Inspection (8.6, 9.5 LD Axle)** or **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
17. Lower the vehicle.

DRIVE PINION FLANGE/YOKE AND/OR OIL SEAL REPLACEMENT (8.6 INCH AXLE W/DRU W/DRUM BRAKES)

Tools Required

- **J 8614-01** Flange/Pulley Holding Tool
- **J 22388** Rear Axle Pinion Oil Seal Installer - Rear. See **Special Tools**.

Removal Procedure

IMPORTANT: Observe and mark the positions of all the driveline components, relative to the propeller shaft and the axles, prior to disassembly. These components include the propeller shafts, drive axles, pinion flanges, output shafts, etc. Reassemble all the components in the exact places in which you removed the parts. Follow any specifications, torque values, and any measurements made prior to disassembly.

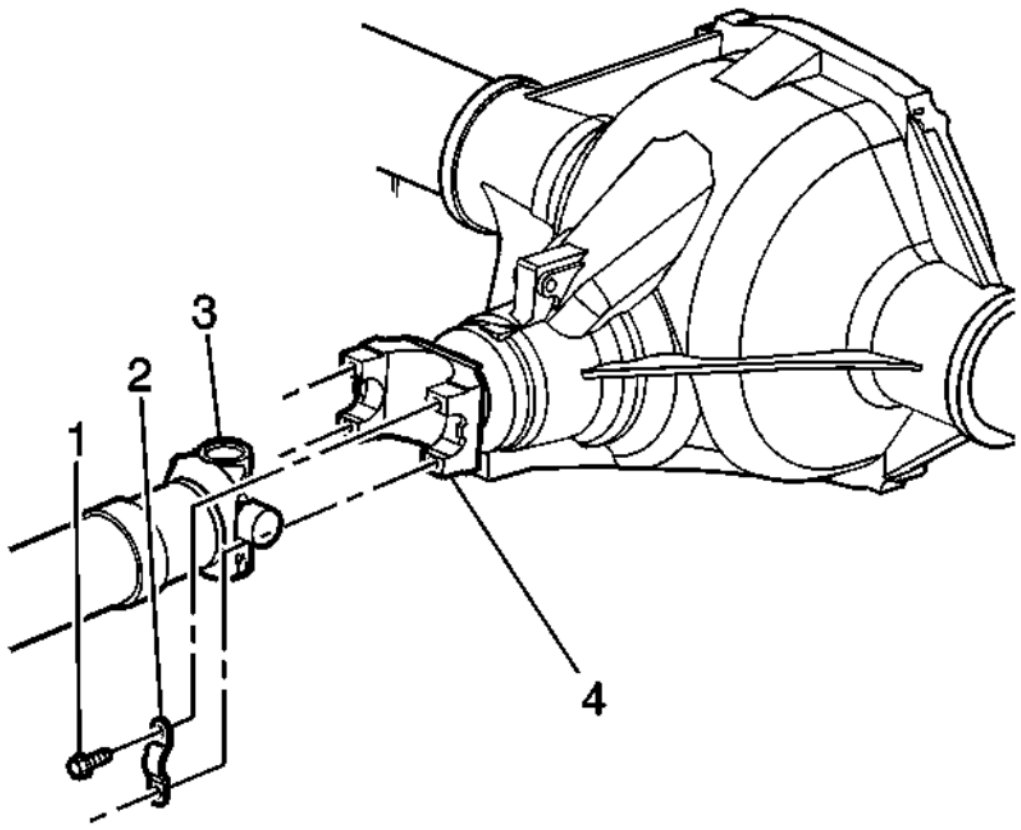


Fig. 117: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Reference mark the rear propeller shaft (3) to the rear axle pinion yoke (4).
3. Disconnect the propeller shaft from the axle.

   Wrap the bearing caps with tape in order to prevent the loss of bearing rollers. Support the propeller shaft as necessary.

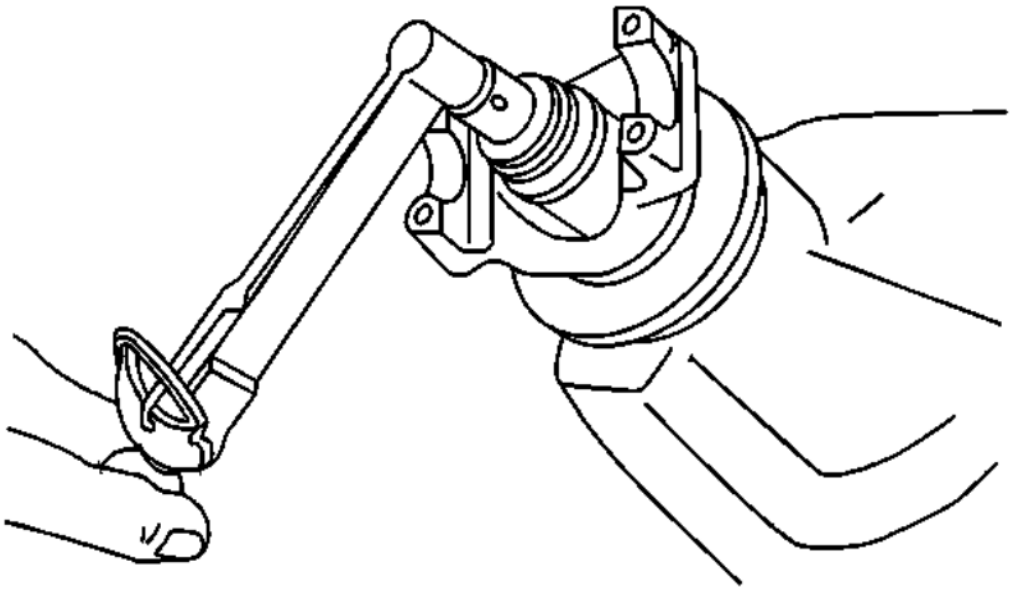


Fig. 118: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

4. Using an inch-pound torque wrench, measure the amount of torque required to rotate the pinion. Record this measurement for reassembly. This will give the combined preload for the following components:
    - The pinion bearings
    - The pinion oil seal
    - The differential case bearings
    - The axle bearings
    - The axle seals

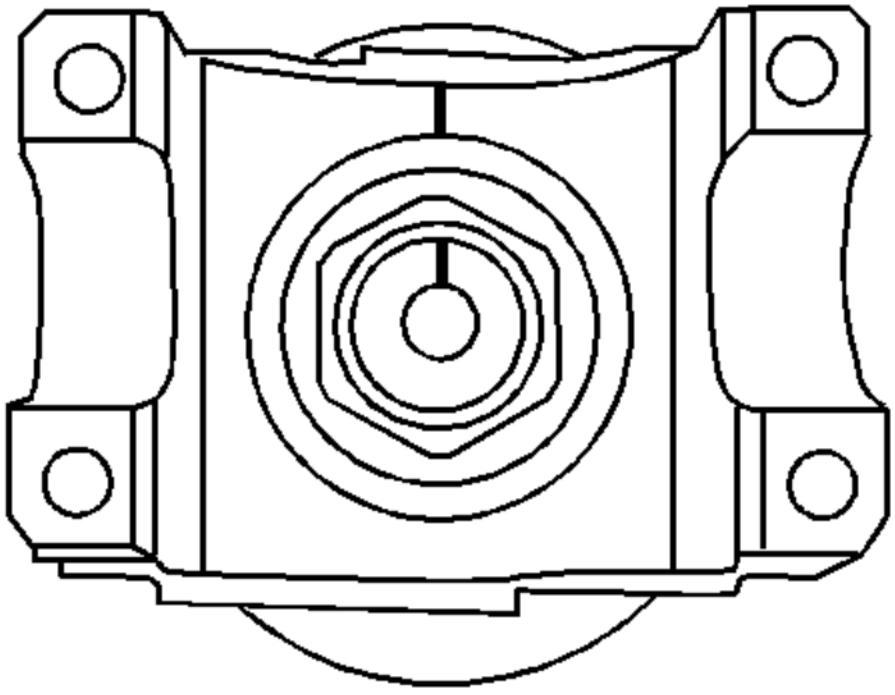


Fig. 119: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

5. Place an alignment mark between the pinion and the pinion yoke.

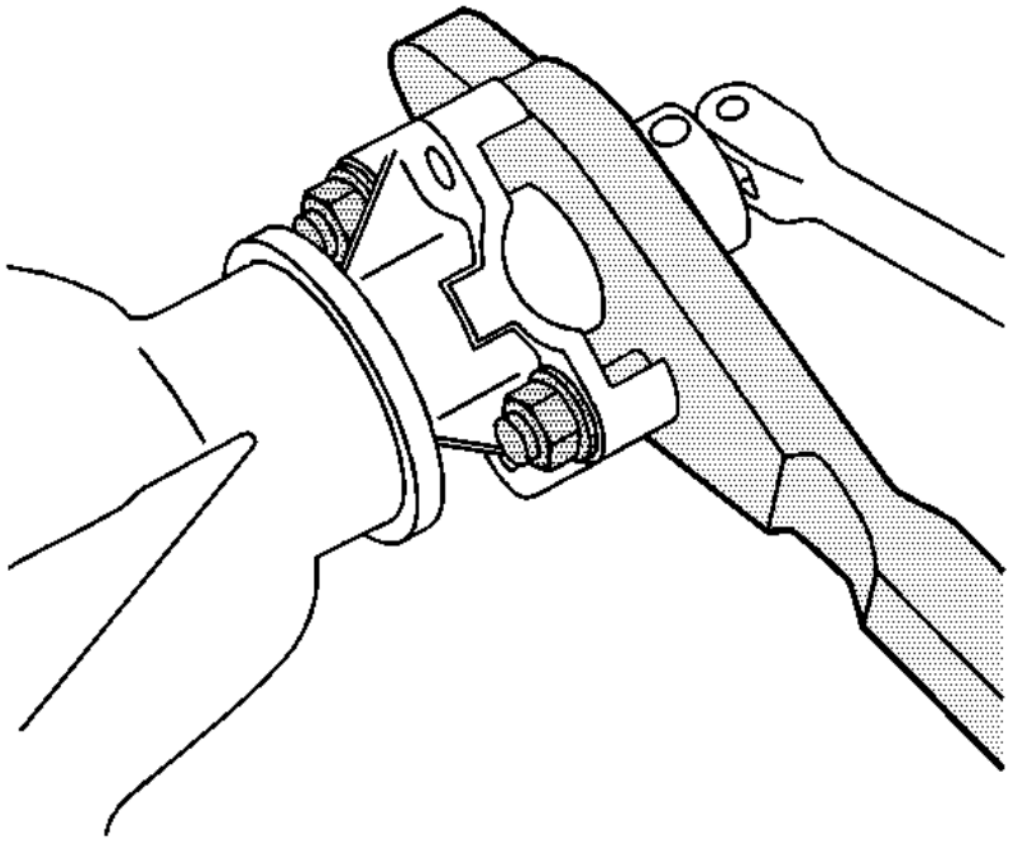


Fig. 120: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

6. Install the **J 8614-01** as shown.
7. While holding the **J 8614-01** , loosen the pinion nut.
8. Remove the washer.

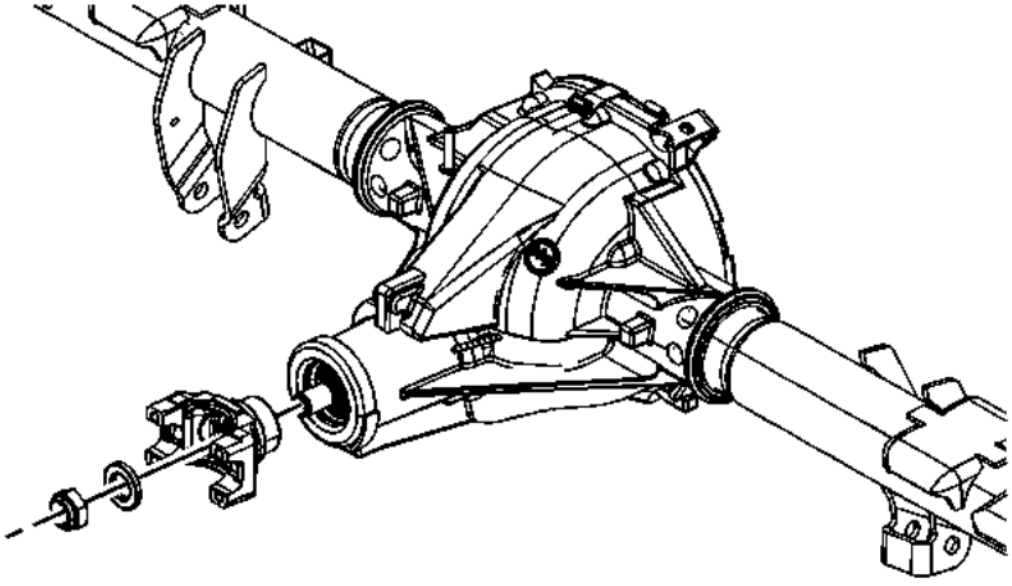


Fig. 121: Pinion Nut And Washer
Courtesy of GENERAL MOTORS CORP.

9. Remove the pinion nut and washer.

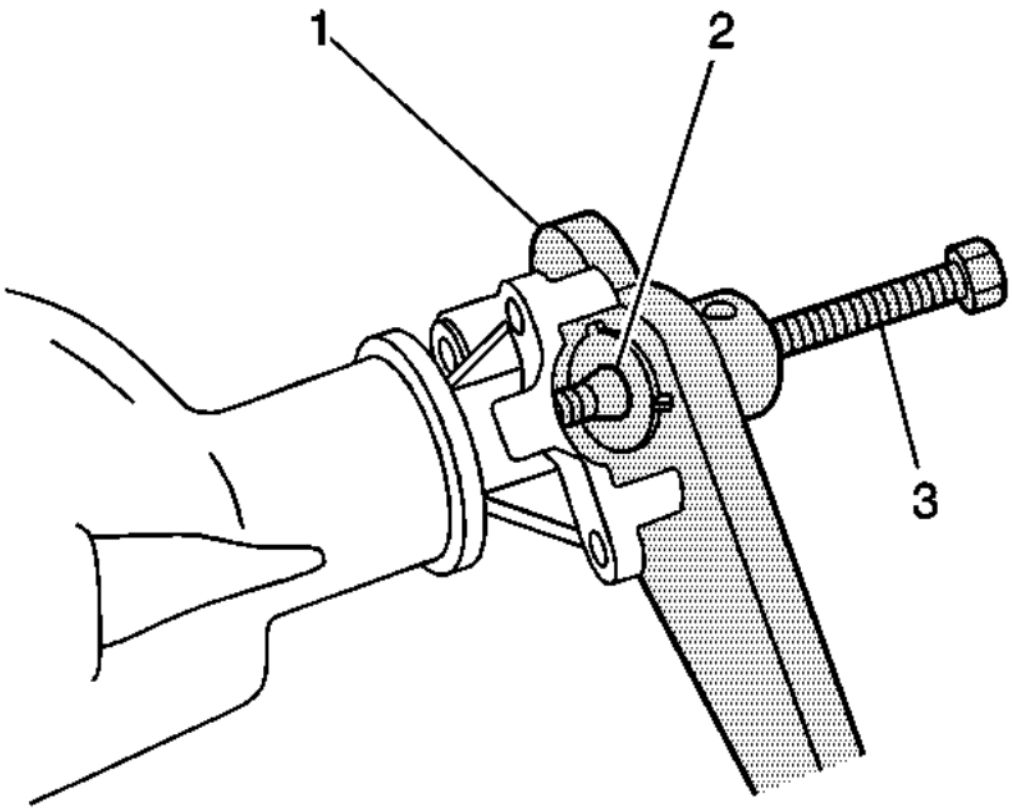


Fig. 122: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

10. Install the J 8614-2 (2) and the J 8614-3 (3) into the **J 8614-01** (1) as shown.
11. Remove the pinion yoke by turning the J 8614-3 (3) clockwise while holding the **J 8614-01** (1).

    Use a container in order to retrieve the lubricant.

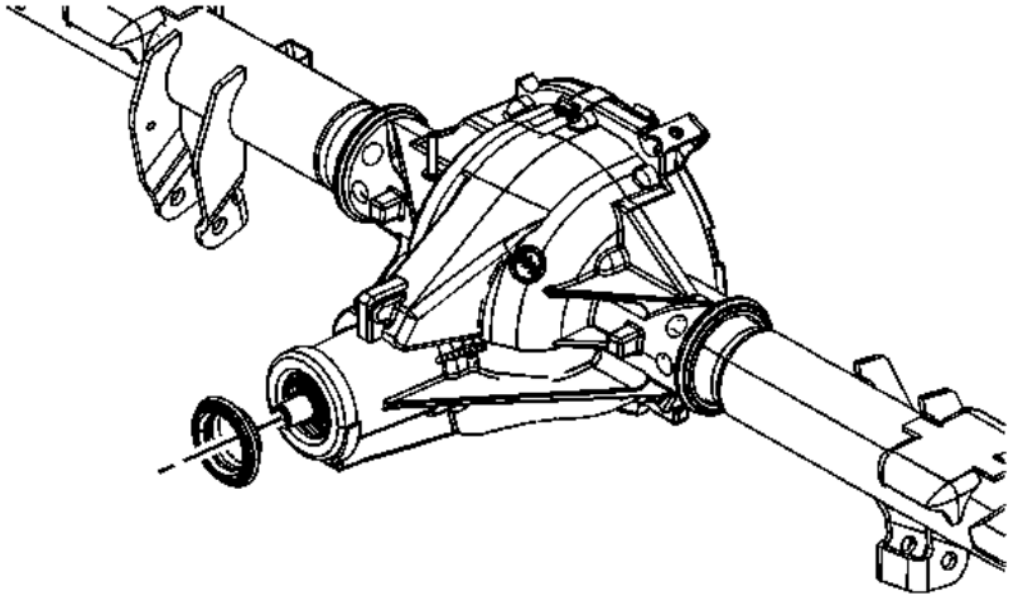


Fig. 123: View Of Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

12. Remove the pinion oil seal. Use a suitable seal removal tool. Do not damage the housing.

Installation Procedure

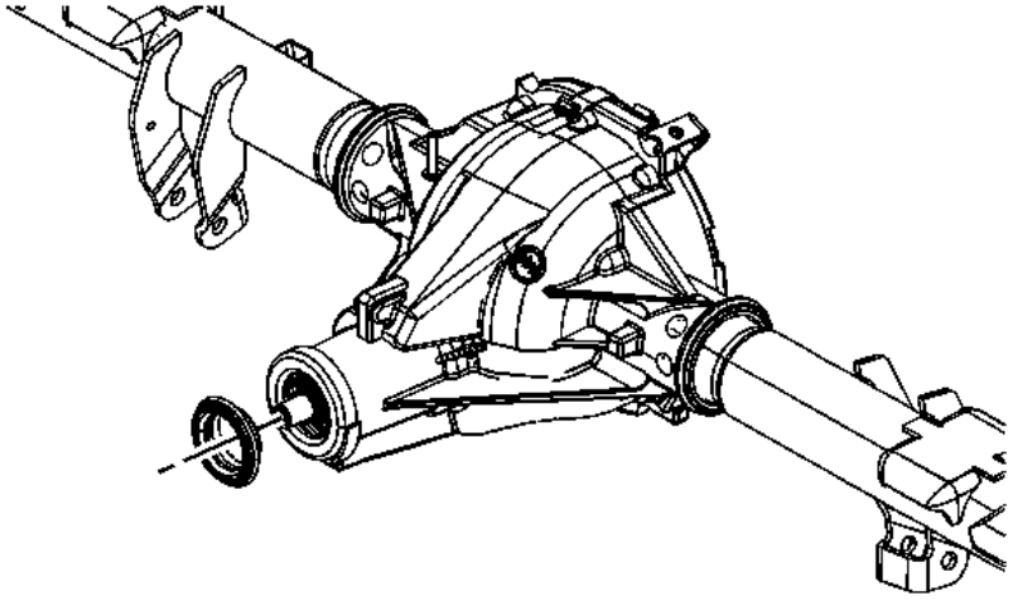


Fig. 124: View Of Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

1. Install a new pinion oil seal using the **J 22388** . See **Special Tools**.

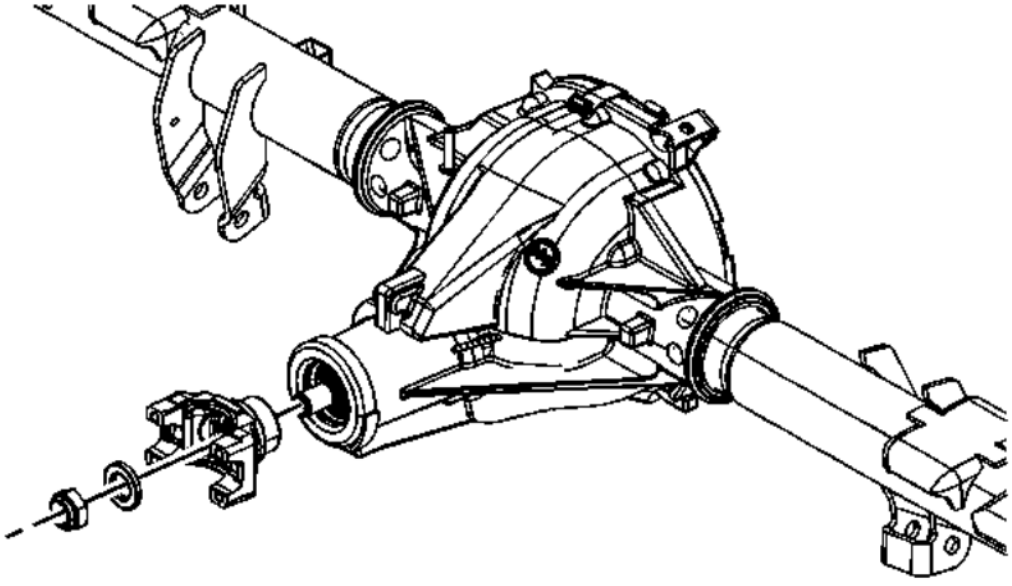


Fig. 125: Pinion Nut And Washer
Courtesy of GENERAL MOTORS CORP.

2. Apply sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent to the splines of the pinion yoke.
3. Install the pinion yoke. Align the marks made during removal.

NOTE: Refer to Pinion Flange/Yoke Installation Notice .

4. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer until a few pinion shaft threads show through the yoke.
5. Install the washer and a NEW pinion nut.

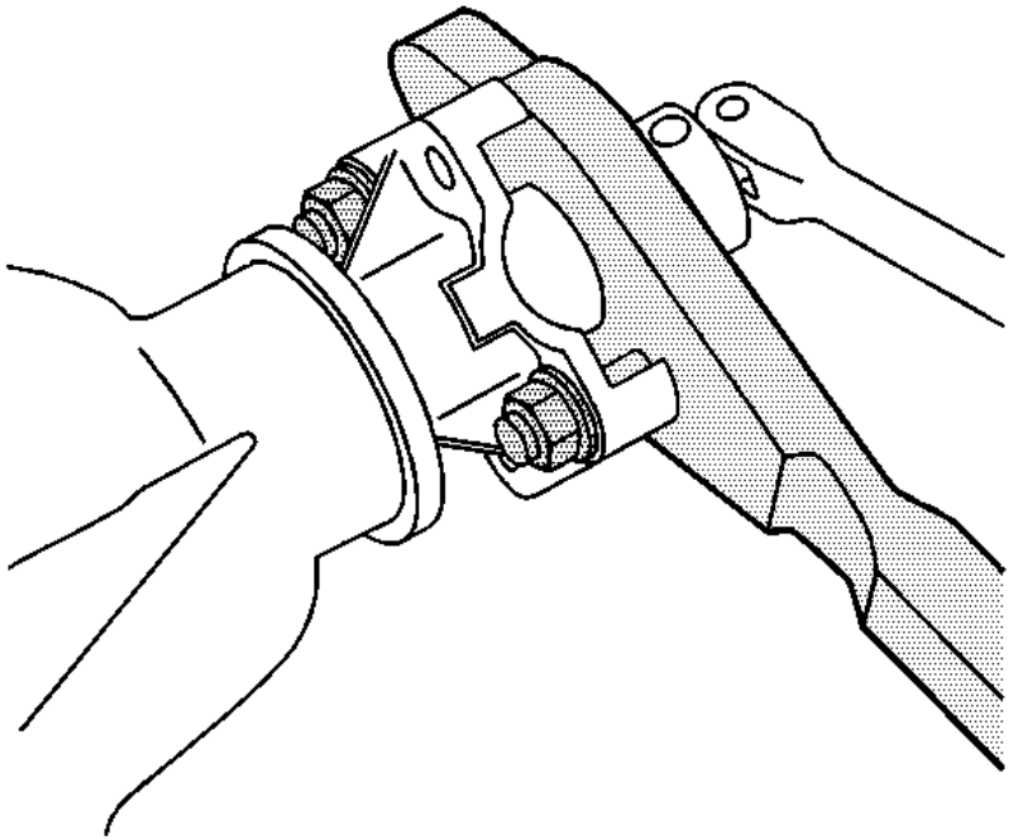


Fig. 126: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

6. Install the **J 8614-01** onto the pinion yoke as shown.

NOTE: Refer to Fastener Notice .

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

7. Tighten the pinion nut while holding the **J 8614-01** .

Tighten: Tighten the nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

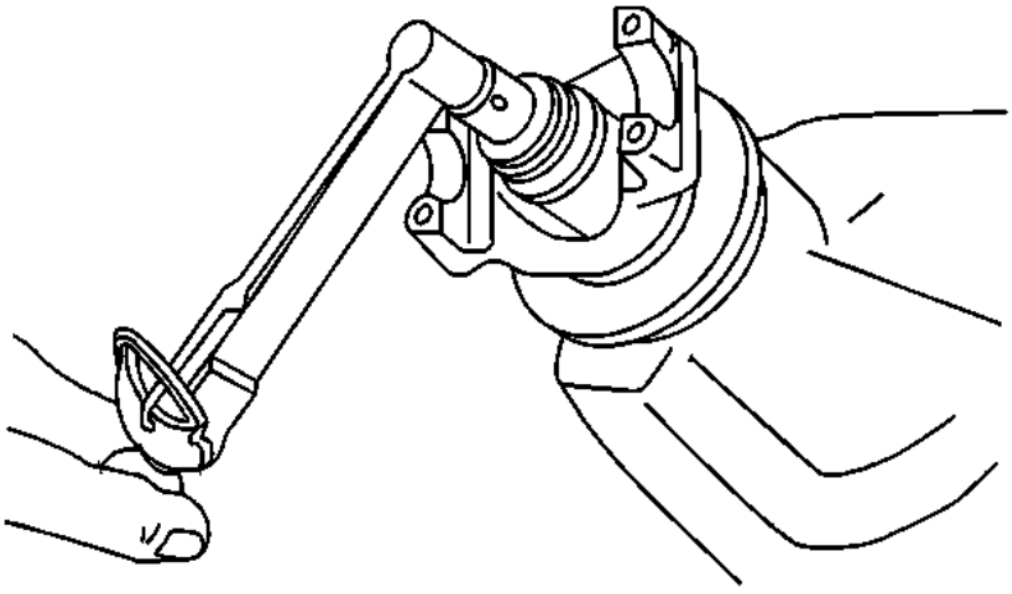


Fig. 127: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

8. Measure the rotating torque of the pinion. Compare this measurement with the rotating torque recorded during removal.

   Tighten: Tighten the nut in small increments, as needed, until the rotating torque is 0.40-0.57 N.m (3-5 lb in) greater than the rotating torque recorded during removal.

9. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.

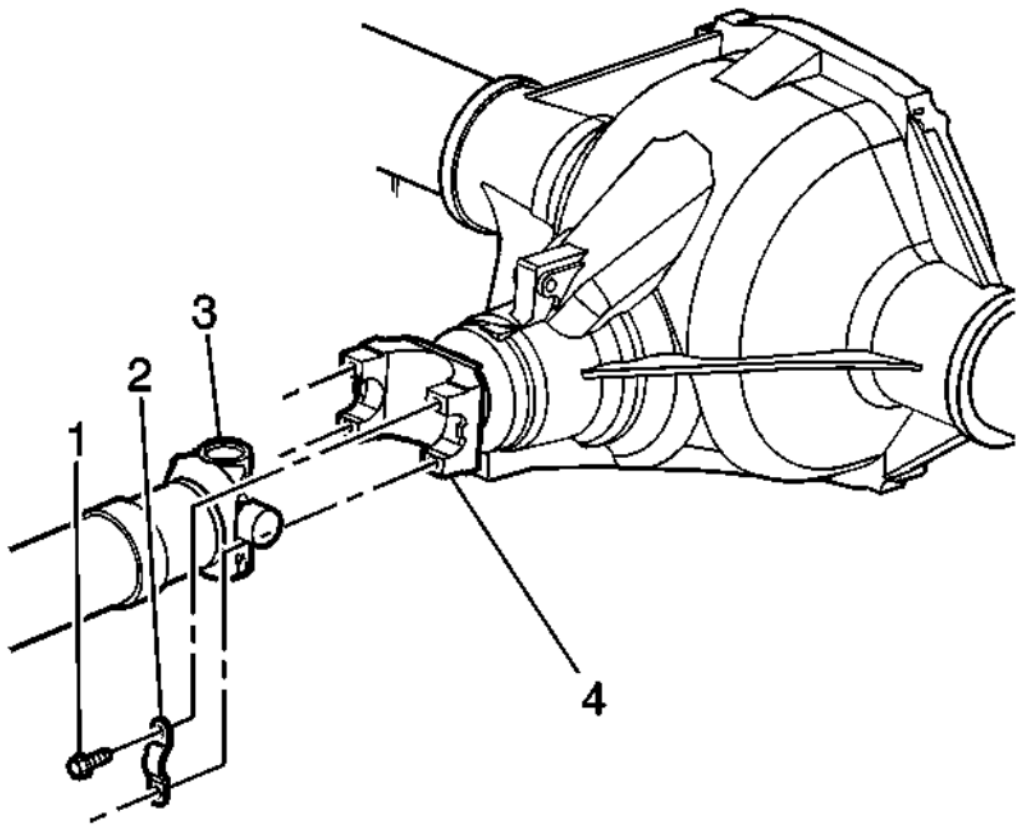


Fig. 128: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

10. Install the propeller shaft (3) to the pinion yoke (4).

    Align the reference marks made during removal.

11. Install the propeller shaft yoke retaining clamps and the bolts.

    Tighten: Tighten the bolts to 25 N.m (18 lb ft).

12. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Rear Axle Lubricant Level Inspection (11.5 Inch Axle)** or **Rear Axle Lubricant Level Inspection (8.6, 9.5 LD Axle)** or **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
13. Lower the vehicle.

DRIVE PINION HOUSING AND/OR SEAL REPLACEMENT

Special Tools

- **J 44414** Pinion Seal Installer. See **Special Tools**.
- **J 22912-B** Bearing Puller
- **J 24433** Pinion Cone and Side Bearing Installer. See **Special Tools**.
- **J 37624** Pinion Bearing Installer. See **Special Tools**.
- **J 8092** Driver Handle
- **J 8608** Rear Pinion Bearing Race Installer. See **Special Tools**.
- **J 8614-01** Flange/Pulley Holding Tool

Removal Procedure

IMPORTANT: Observe and mark the positions of all the driveline components, relative to the propeller shaft and the axles, prior to disassembly. These components include the propeller shafts, drive axles, pinion flanges, output shafts, etc. Reassemble all the components in the exact places in which you removed the parts. Follow any specifications, torque values, and any measurements made prior to disassembly.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the axle lubricant. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
3. Remove the axle shafts. Refer to **Rear Axle Shaft and/or Gasket Replacement**.

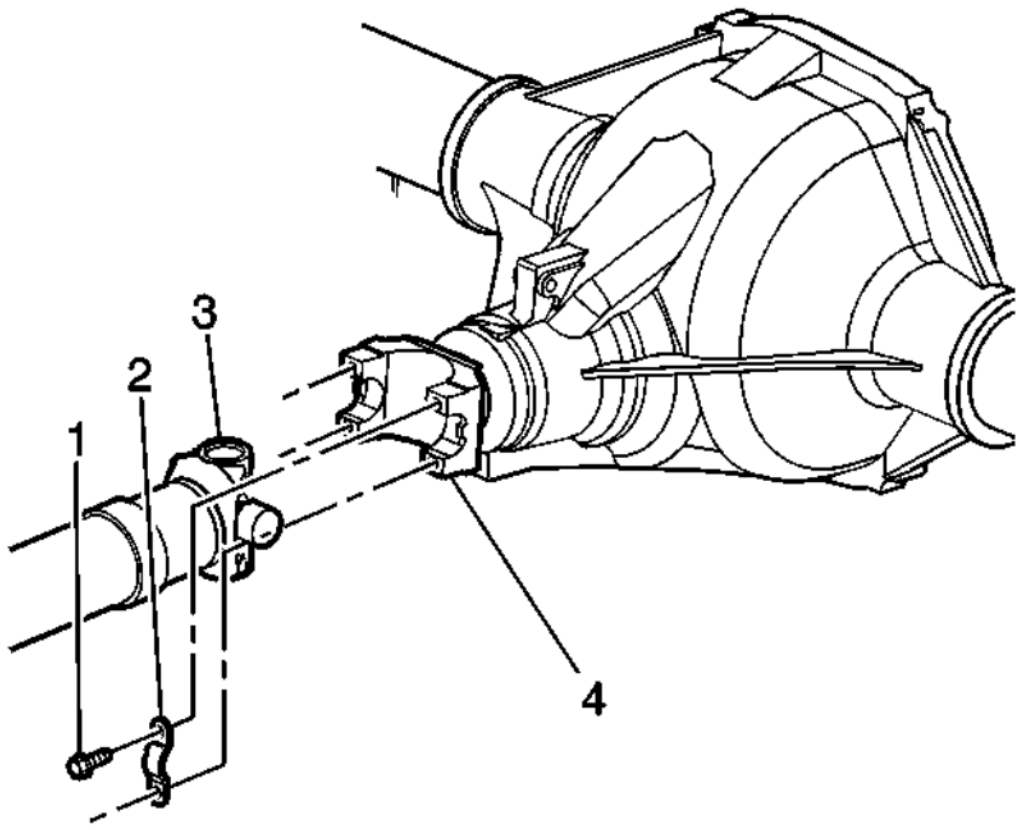


Fig. 129: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Reference mark the rear propeller shaft (3) to the rear axle pinion yoke (4).
5. Disconnect the propeller shaft from the axle.

Wrap the bearing caps with tape in order to prevent the loss of bearing rollers.

Support the propeller shaft as necessary.

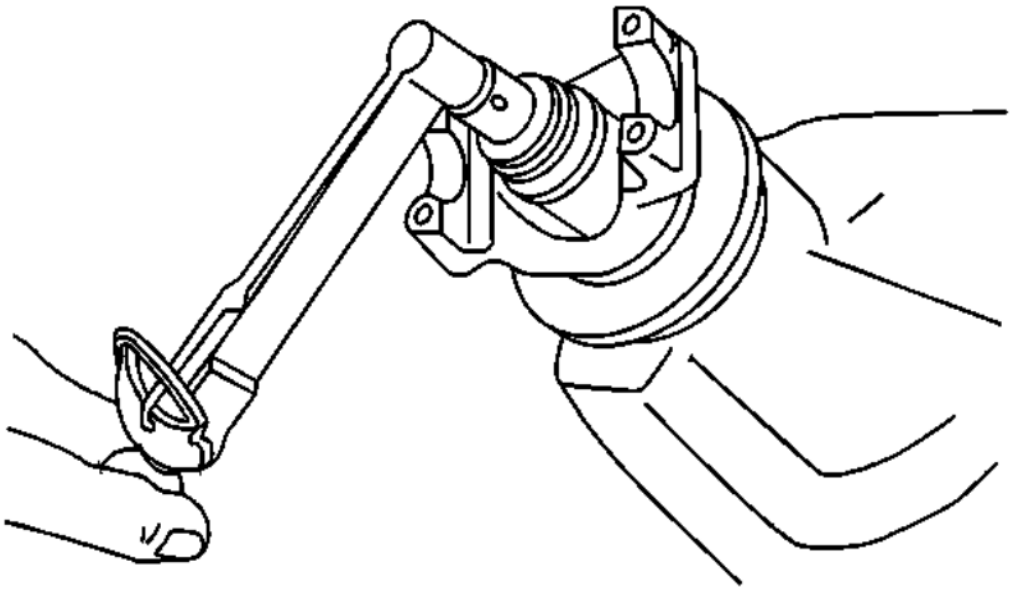


Fig. 130: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

6. Measure the amount of torque required to rotate the pinion and the ring gear. Use an inch-pound torque wrench. Record this measurement for reassembly. This will give the combined preload for the following components:
    - The pinion bearings
    - The pinion pilot bearing
    - The pinion oil seal
    - The differential case bearings

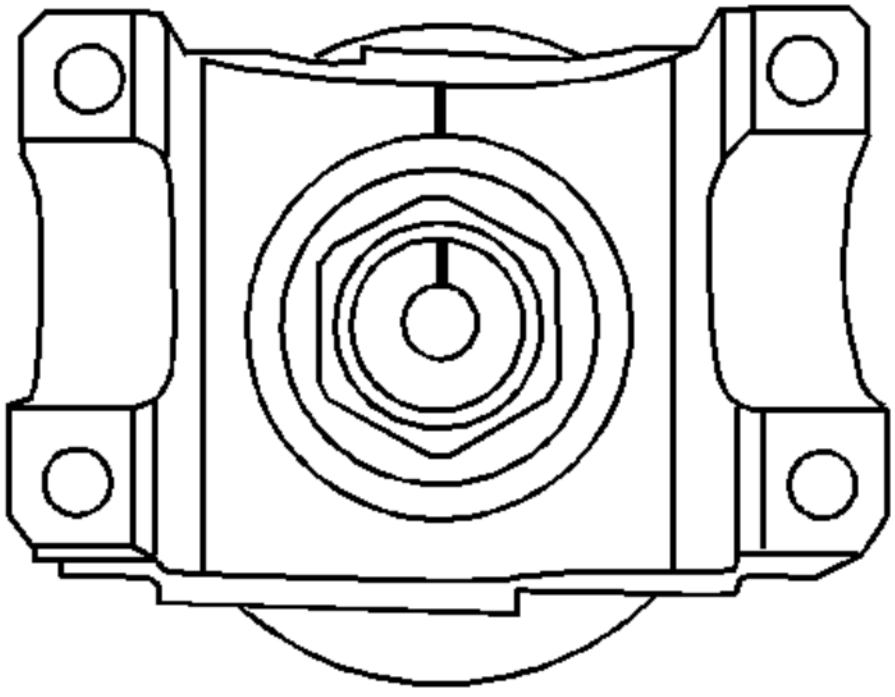


Fig. 131: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

7. Place an alignment mark between the pinion and the pinion yoke.
8. Remove the pinion gear bearing retainer bolts.
9. Remove the pinion gear bearing retainer and the pinion.
10. Remove the selective shim.
11. Measure the amount of torque required to rotate the pinion. Use an inch-pound torque wrench. Record this measurement for reassembly.

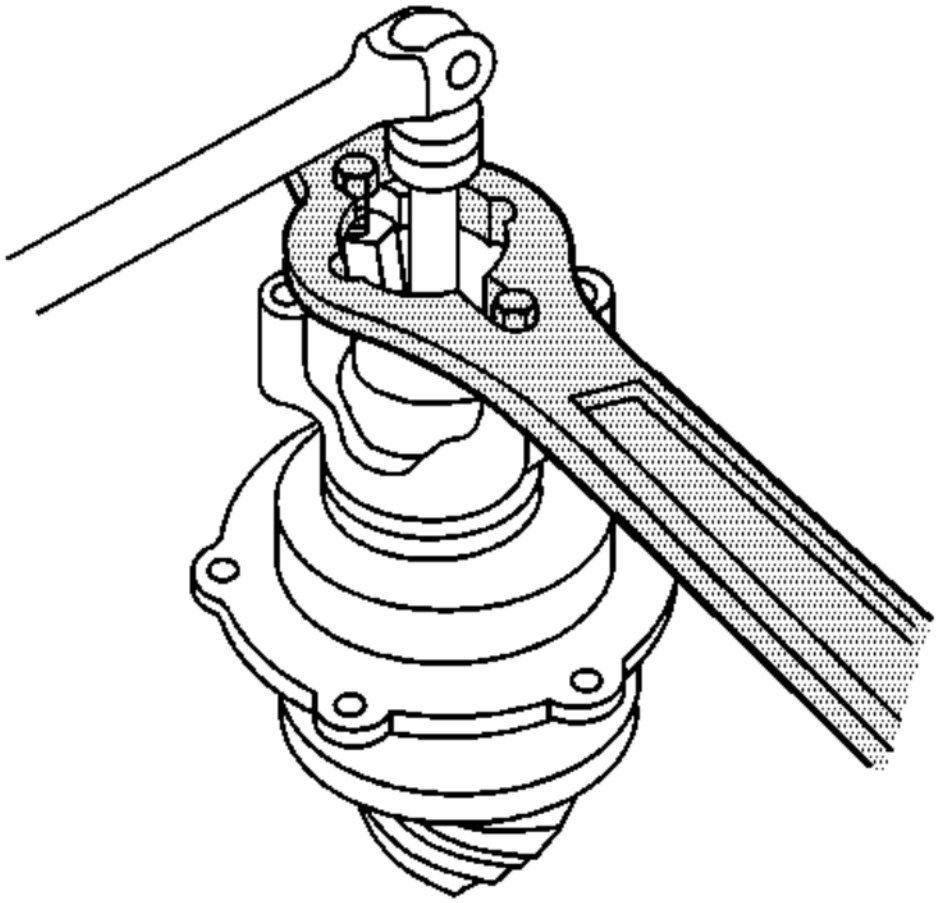


Fig. 132: Installing J 8614-01 To Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

12. Install the **J 8614-01** as shown.
13. Remove the pinion nut while holding the **J 8614-01** .
14. Remove the washer.

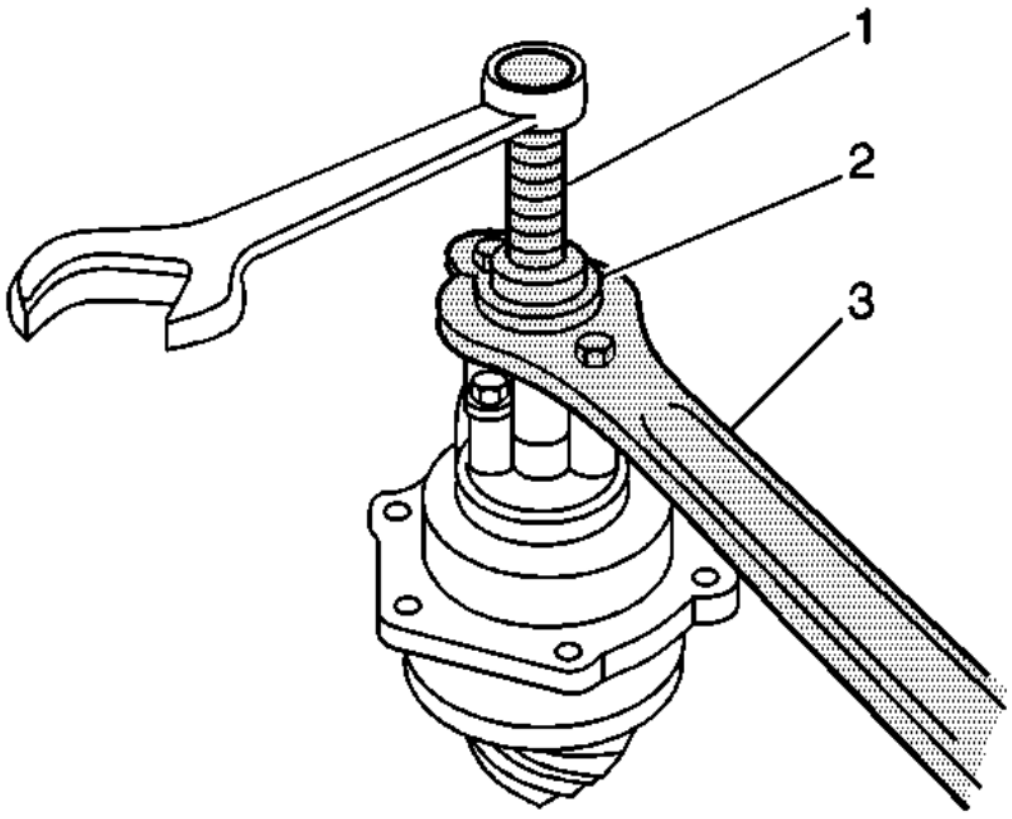


Fig. 133: Installing J 8614-3, J 8614-2 & J 8614-01 To Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

15. Install the J 8614-2 (2) and the J 8614-3 (1) into the **J 8614-01** (3) as shown.
16. Remove the pinion yoke by turning the J 8614-3 (1) clockwise while holding the **J 8614-01** (3).
17. Remove the pinion oil seal. Use a suitable seal removal tool. Do not damage the housing.
18. Remove the outer pinion bearing.

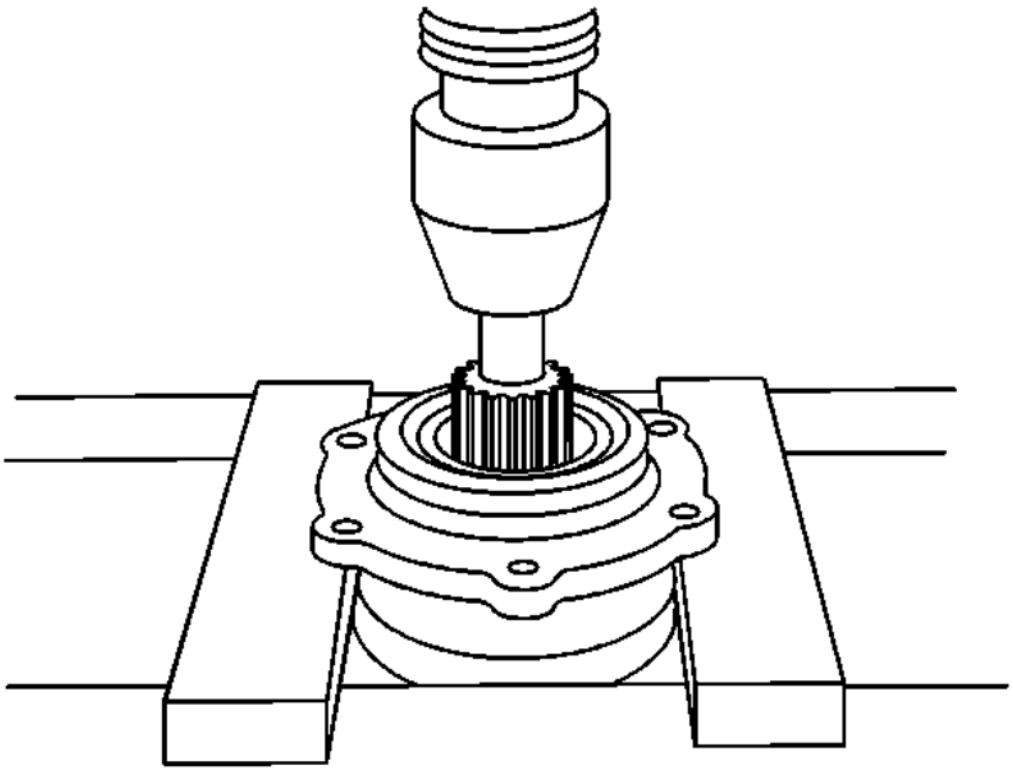


Fig. 134: Removing Pinion
Courtesy of GENERAL MOTORS CORP.

19. Remove the pinion.

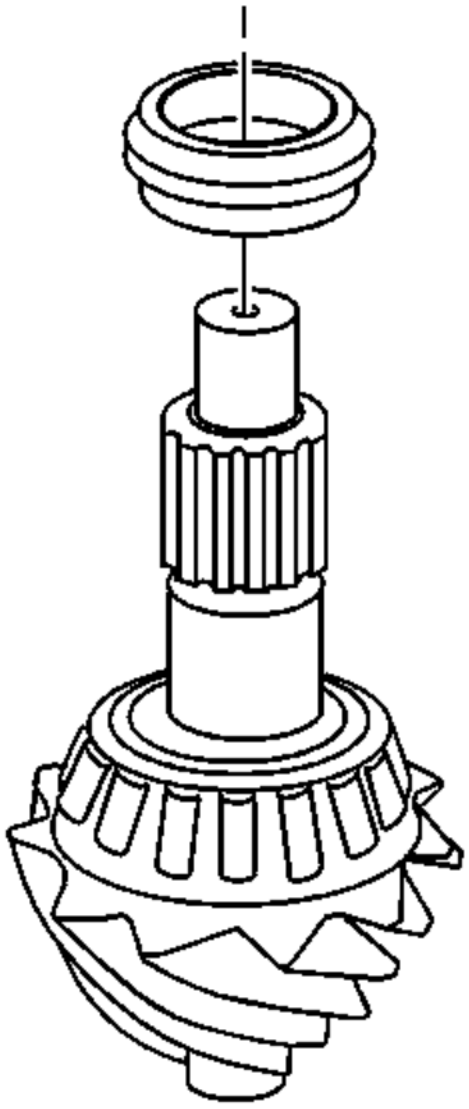


Fig. 135: View Of Collapsible Spacer
Courtesy of GENERAL MOTORS CORP.

20. Remove the collapsible spacer.

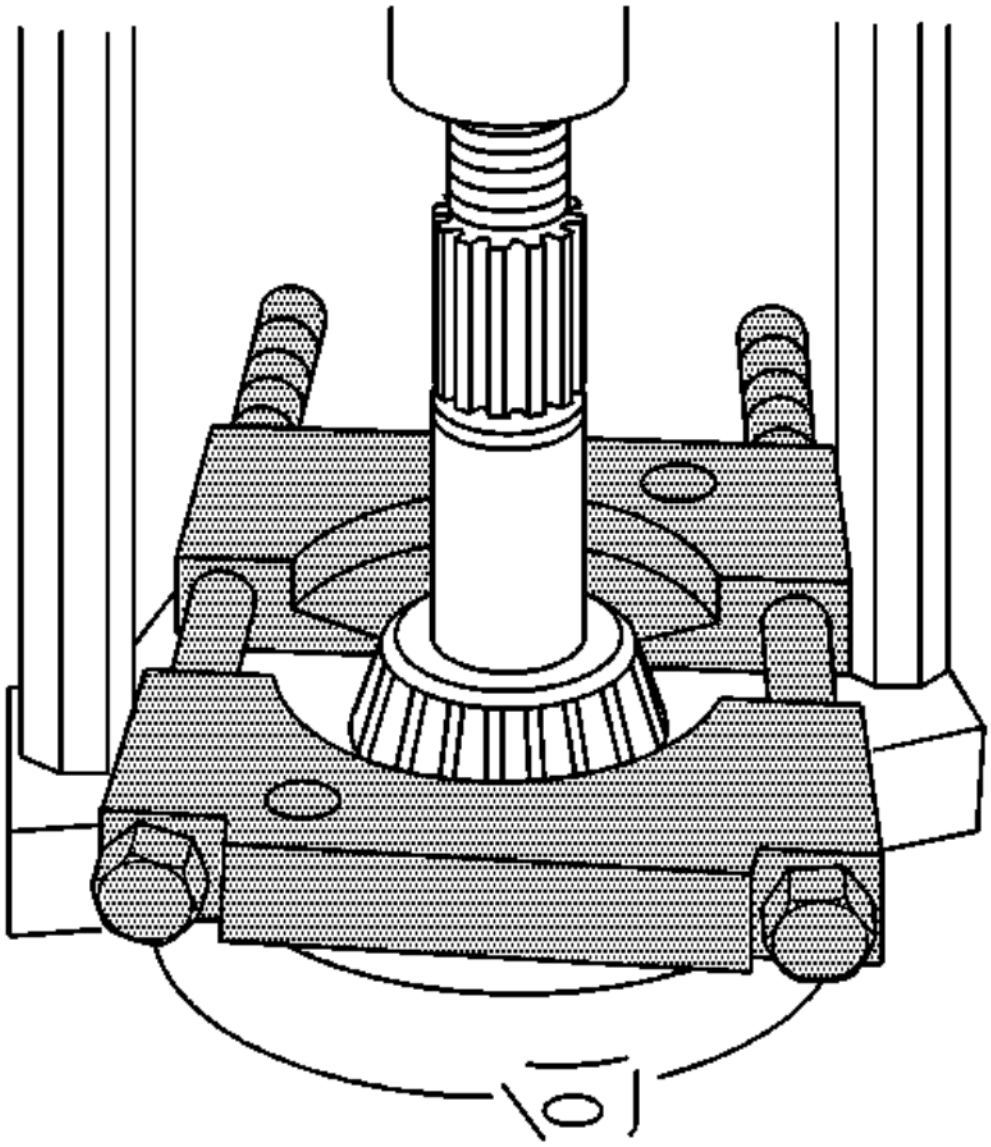


Fig. 136: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

21. Remove the inner pinion bearing from the pinion using the **J 22912-B** and a hydraulic press.

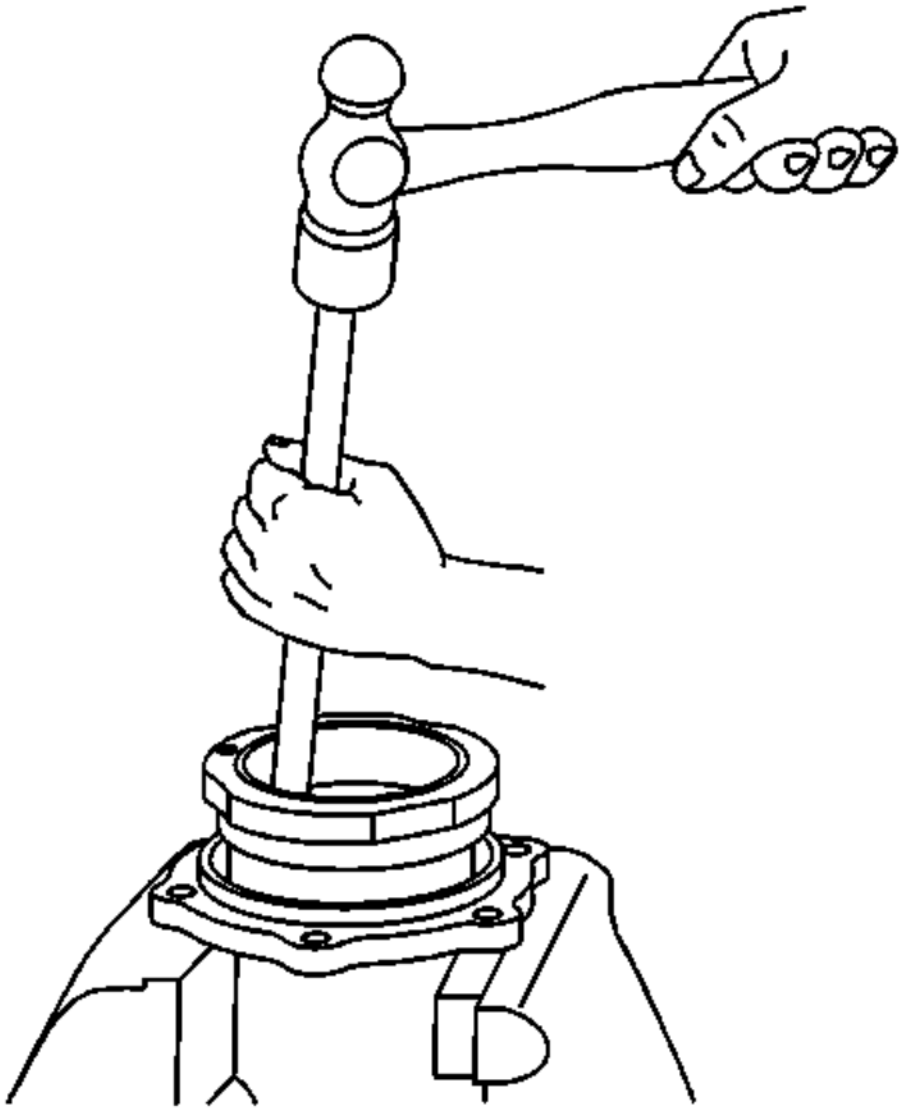


Fig. 137: Removing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

22. Remove the outer pinion bearing cup using a hammer and a brass drift in the slots provided.

    Move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.

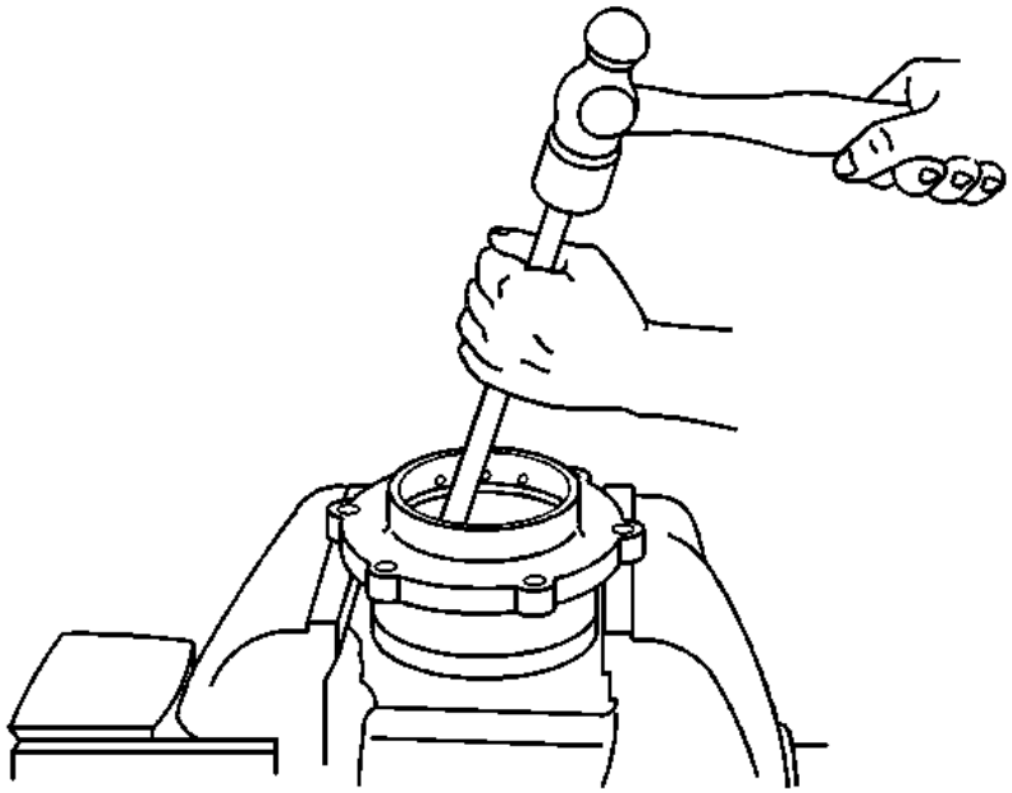


Fig. 138: Removing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

23. Remove the inner pinion bearing cup using a hammer and a brass drift in the slots provided.

    Move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.

Installation Procedure

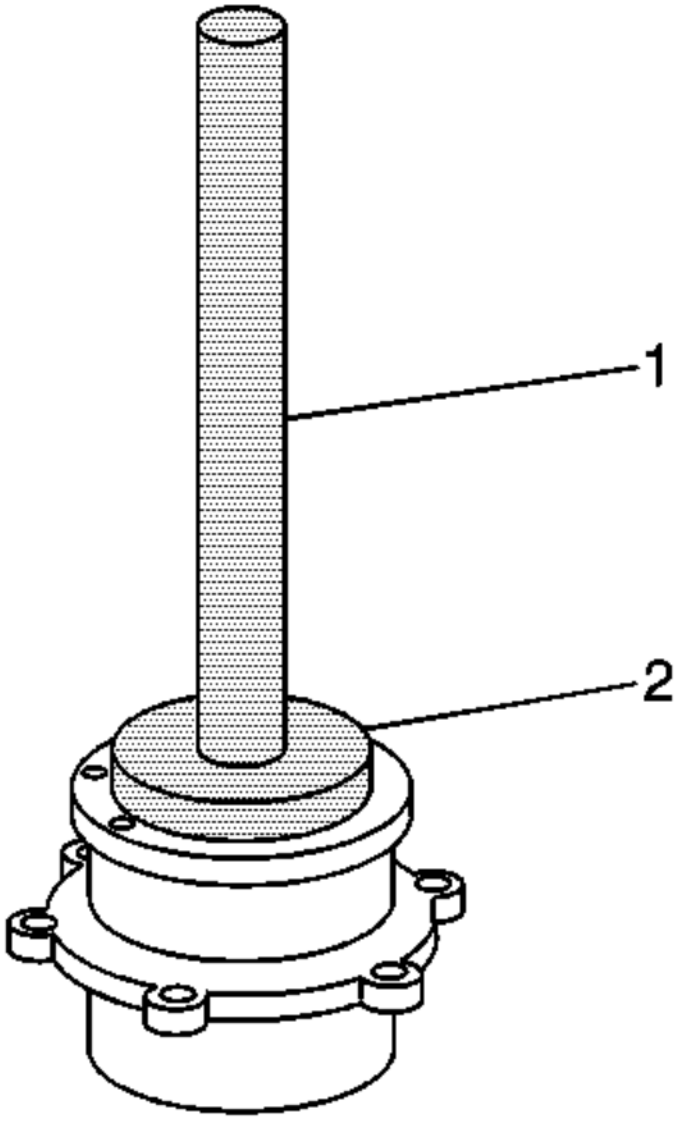


Fig. 139: Installing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

1. Install the inner pinion bearing cup into the pinion gear bearing retainer using the **J 37624** (2) and the **J 8092** (1). See **Special Tools**.

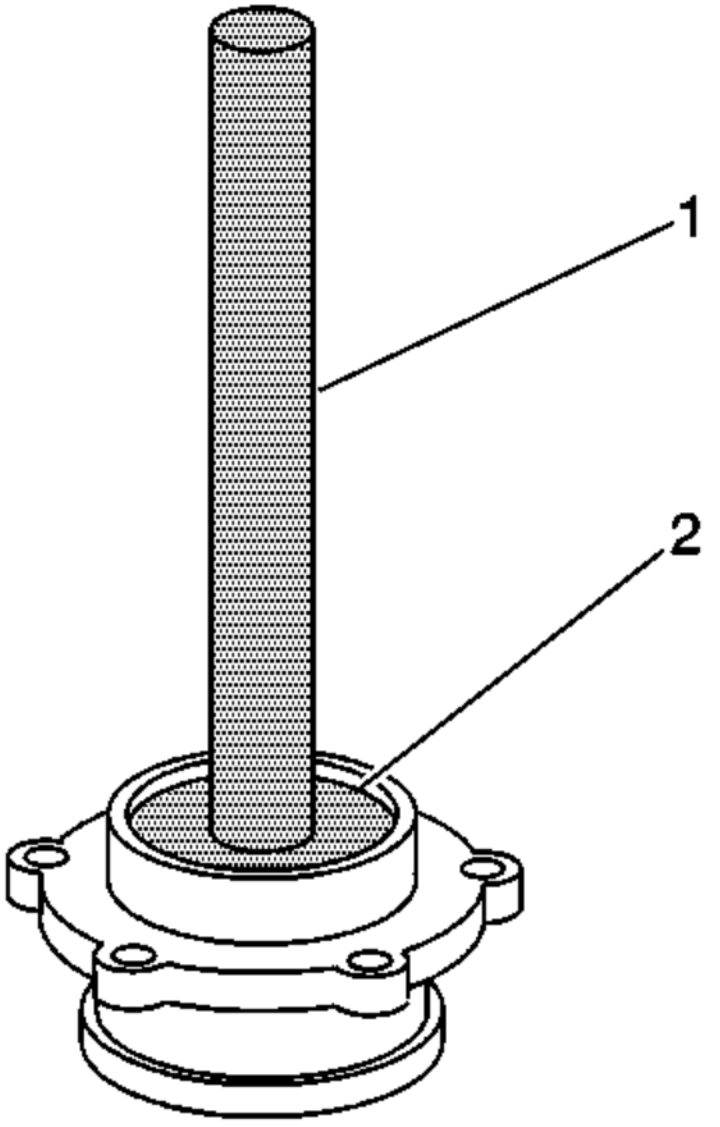


Fig. 140: Installing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

2. Install the outer pinion bearing cup into the pinion gear bearing retainer using the **J 8608** (2) and the **J 8092** (1). See **Special Tools**.

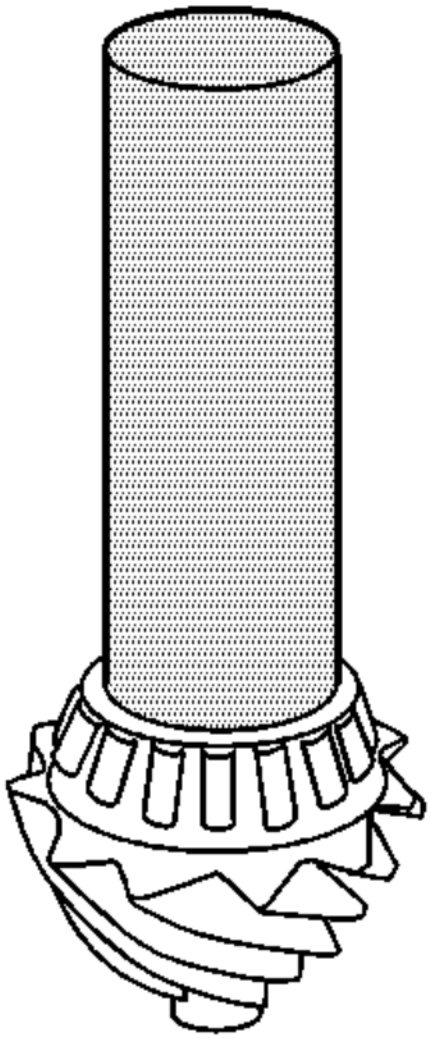


Fig. 141: Installing Inner Pinion Bearing Using J 24433
Courtesy of GENERAL MOTORS CORP.

3. Install the inner pinion bearing using the **J 24433** . See **Special Tools**.

   Press the bearing on until the cone seats on the pinion.

4. Install a new collapsible spacer.

5. Lubricate the pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

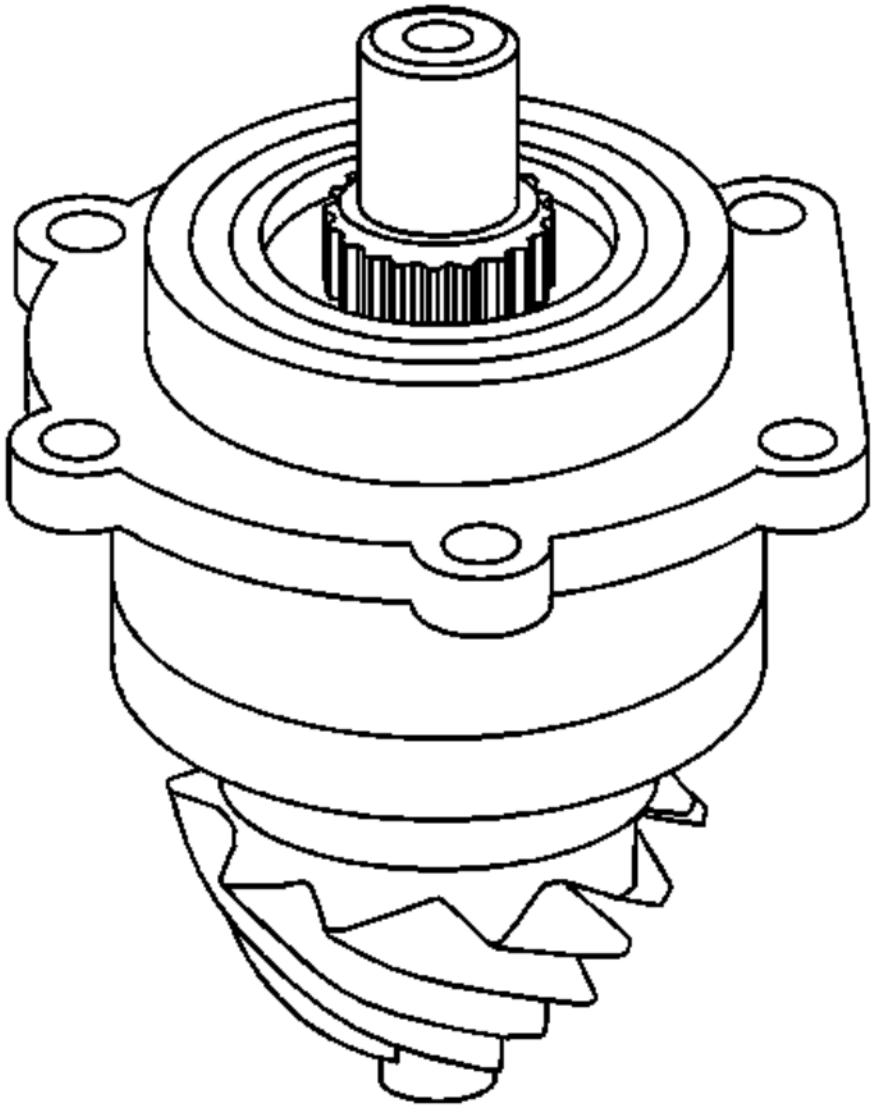


Fig. 142: Pinion Retainer
Courtesy of GENERAL MOTORS CORP.

6. Install the pinion into the pinion gear bearing retainer.

7. Install the outer pinion bearing onto the pinion.

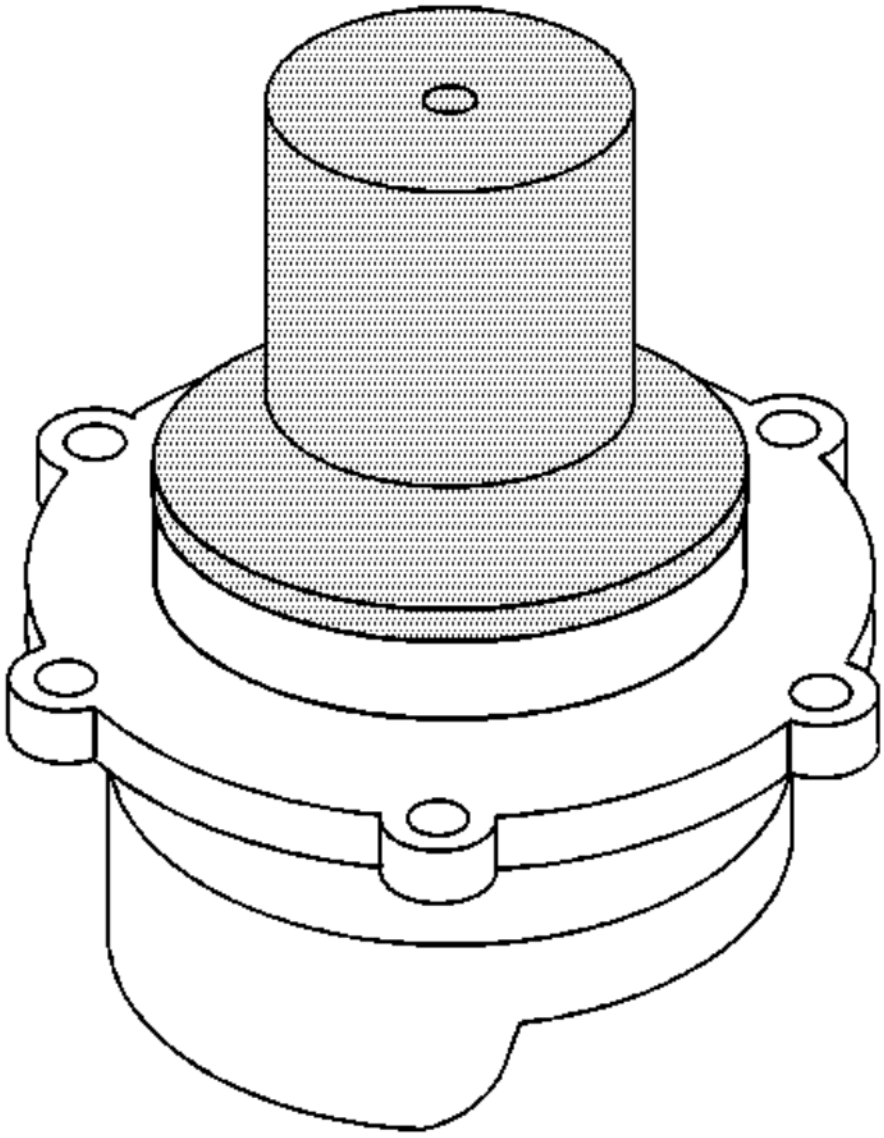


Fig. 143: Installing New Pinion Oil Seal Using J 44414
Courtesy of GENERAL MOTORS CORP.

8. Install a new pinion oil seal using the **J 44414** . See **Special Tools**.

9. Apply sealant, GM P/N 12346004 (Canadian P/N 10953480) or equivalent, to the splines of the pinion yoke.
10. Install the pinion yoke.

    Align the marks made during removal.

    NOTE: Do not hammer the pinion flange/yoke onto the pinion shaft. Pinion components may be damaged if the pinion flange/yoke is hammered onto the pinion shaft.

11. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer until a few pinion shaft threads show through the yoke.
12. Install the washer and a new pinion nut.

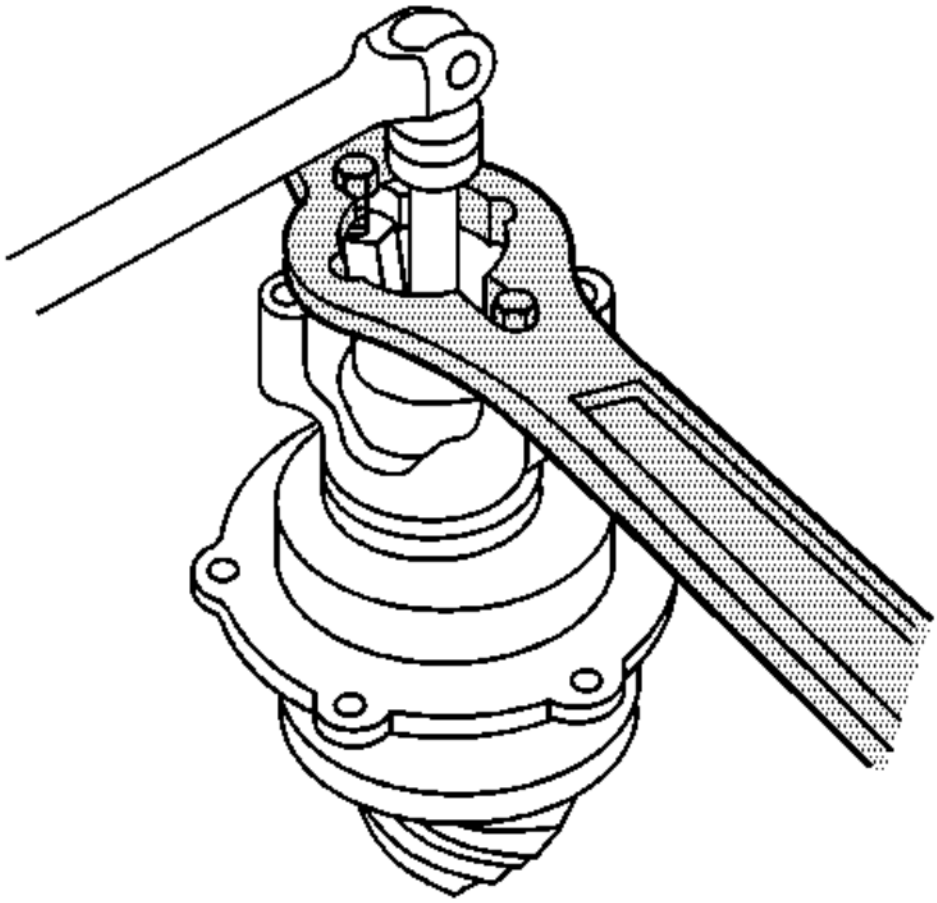


Fig. 144: Installing J 8614-01 To Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

13. Install the **J 8614-01** onto the pinion yoke as shown.

NOTE: Refer to Fastener Notice .

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

14. Tighten the pinion nut while holding the **J 8614-01** .

Tighten: Tighten the nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

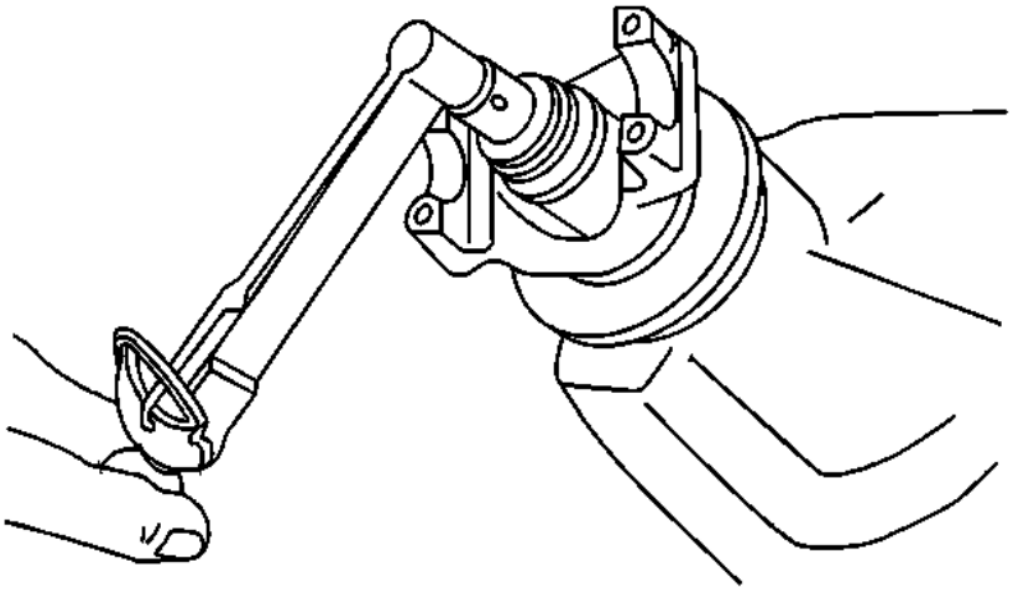


Fig. 145: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

15. Measure the rotating torque of the pinion. Compare this measurement with the rotating torque recorded during removal.

    Tighten: Tighten the nut in small increments, as needed, until the rotating torque is 0.40-0.57 N.m (3-5 lb in) greater than the rotating torque recorded during removal.

16. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated. Recheck the rotating torque and adjust if necessary.
17. Determine the selective shim thickness for the pinion gear bearing retainer. Refer to **Pinion Depth Adjustment (10.5 Inch Axle)** or **Pinion Depth Adjustment (8.6, 9.5/9.5LD, and 11.5 Inch Axles)**.

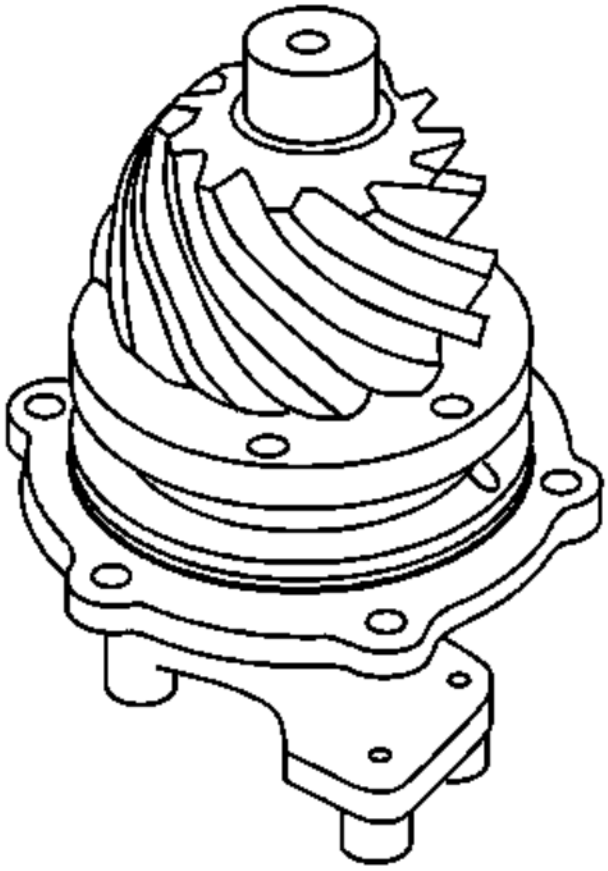


Fig. 146: Pinion Gear Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

18. Apply sealant, GM P/N 1052942 (Canadian P/N 10953466) or equivalent, to sealing surface of the pinion gear bearing retainer.
19. Install the selective shim.

    Align the tab on the shim with the unmachined surface of the pinion gear bearing retainer.

20. Apply sealant, GM P/N 1052942 (Canadian P/N 10953466) or equivalent, to surface of the selective shim.
21. Install the pinion gear bearing retainer.

22. Install the pinion gear bearing retainer bolts.

    Tighten: Tighten the pinion gear bearing retainer bolts to 88 N.m (65 lb ft).

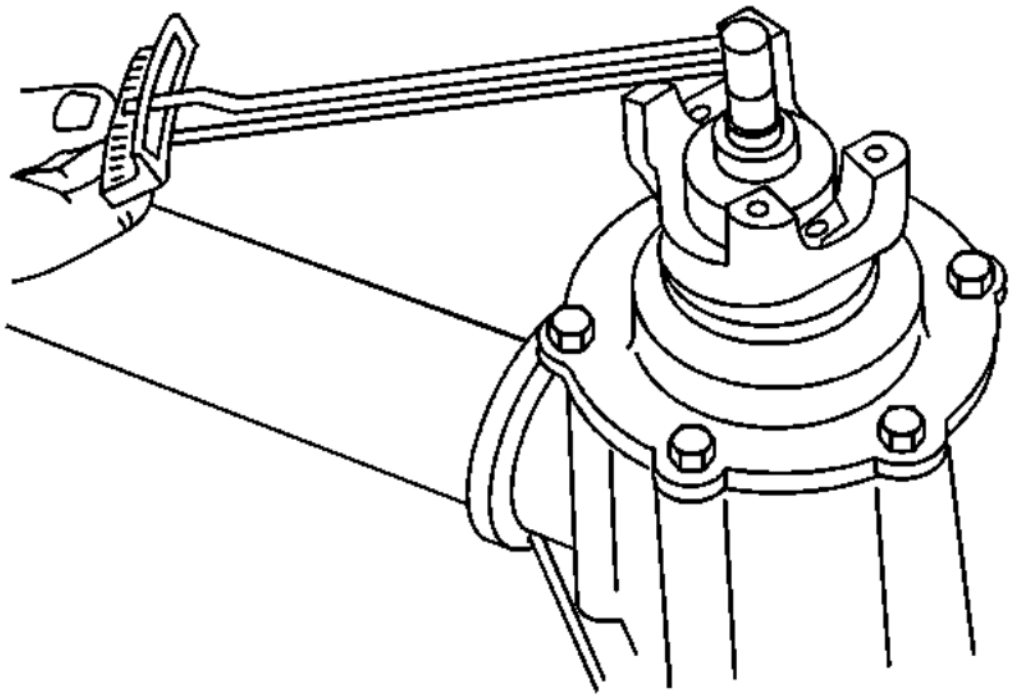


Fig. 147: Measuring Pinion & Ring Gear Rotating Torque
Courtesy of GENERAL MOTORS CORP.

23. Measure the rotating torque of the pinion and the ring gear. Compare this measurement with the rotating torque recorded during removal.

    Specification: The rotating torque of the drive pinion and the differential assembly should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.

24. If the rotating torque of the pinion and the ring gear is not within specifications, adjust the preload of the pinion or the differential side bearings as necessary.

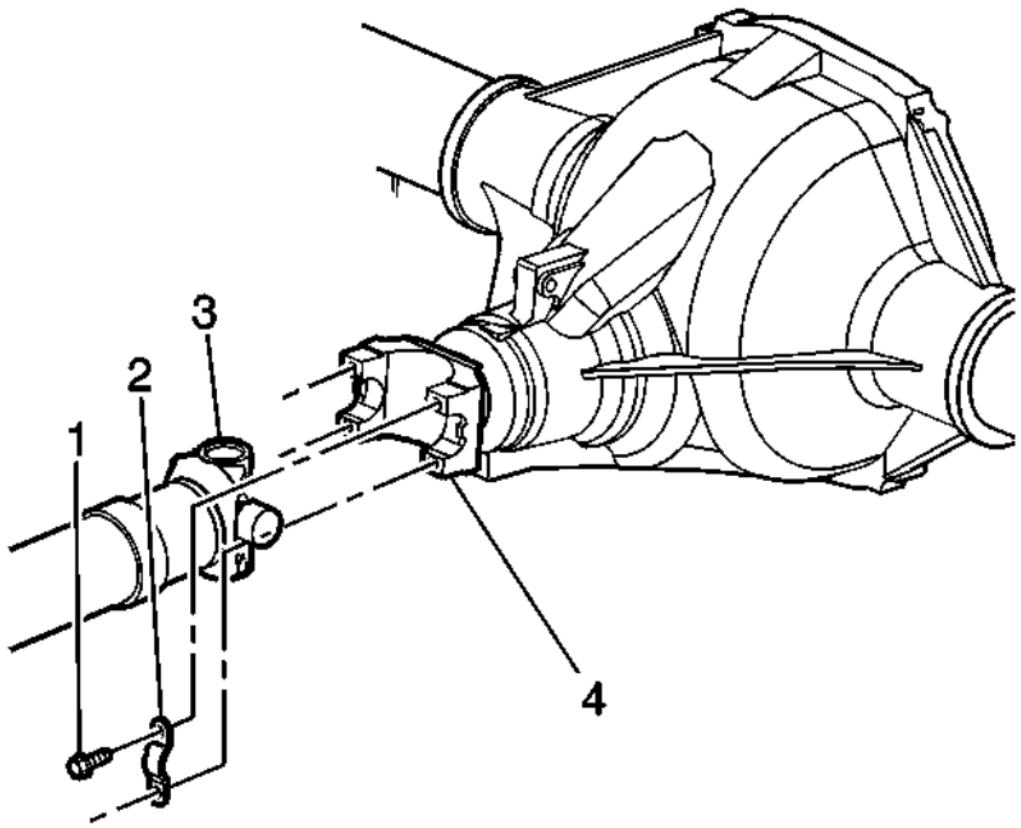


Fig. 148: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

25. Install the propeller shaft (3) to the pinion yoke (4).

    Align the reference marks made during removal.

26. Install the propeller shaft yoke retaining clamps and the bolts.

    Tighten: Tighten the propeller shaft yoke retaining clamp bolts to 25 N.m (18 lb ft).

27. Install the axle shafts. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
28. Fill the axle with axle lubricant. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.

29. Lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT (8.6, 9.5/9.5LD, AND 11.5 INCH AXLES)

Tools Required

- **J 22536** Pinion Driver, 8. See **Special Tools**.6 inch, 9.5/9.5LD inch axles
- **J 44421** Pinion Remover, 11. See **Special Tools**.5 inch axle

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.
3. Remove the pinion yoke and the oil seal. Refer to **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (All Except 9.75 Inch Axle)** or **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (8.6 Inch Axle w/Drum Brakes)**.

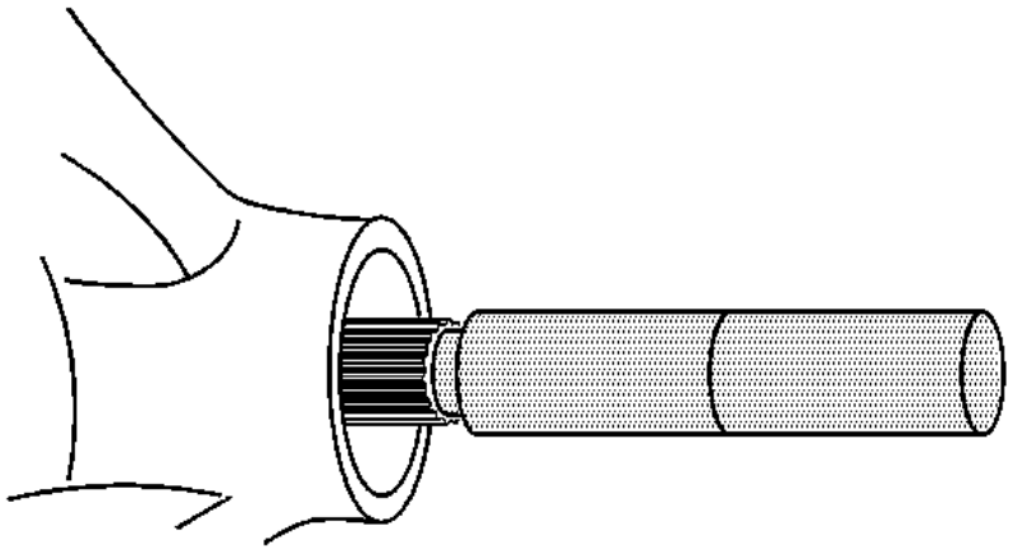


Fig. 149: Installing J 22536 Or J 44421 On Pinion
Courtesy of GENERAL MOTORS CORP.

4. Install the **J 22536** , 8. See **Special Tools**.6 inch or 9.5/9.5LD inch axle, or the **J 44421** , 11. See **Special Tools**.5 inch axle as shown.

   Ensure that the **J 22536** or the **J 44421** is firmly seated on the pinion. See **Special Tools**.

5. Drive the pinion out using the **J 22536** or the **J 44421** and a hammer. See **Special Tools**.

   Strike the **J 22536** or the **J 44421** slowly. See **Special Tools**. Do not let the pinion fall out of the rear axle housing.

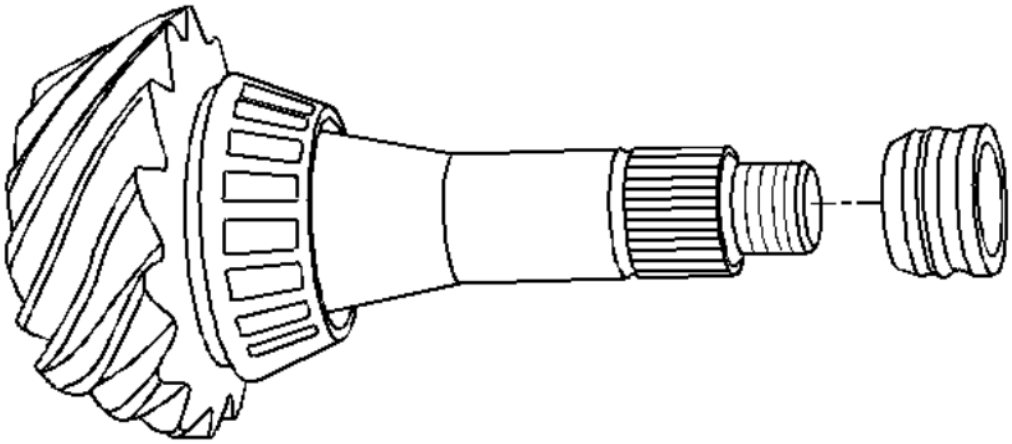


Fig. 150: View Of Collapsible Spacer & Pinion
Courtesy of GENERAL MOTORS CORP.

6. Remove the collapsible spacer from the pinion. Discard the spacer.
7. Remove the pinion bearings and the cups. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.

IMPORTANT: The ring gear bolts on the 8.6 inch and the 9.5/9.5LF inch axles have left-hand threads. The ring gear bolts on the 11.5 inch axle have right-hand threads.

8. Remove the gear bolts. Discard the bolts.

NOTE: Refer to Ring Gear Removal Notice .

9. Remove the ring gear from the differential. Drive the gear off with a brass drift if necessary.

Installation Procedure

IMPORTANT: The mating surface of the ring gear and the differential case must be clean and free of burrs before installing the ring gear.

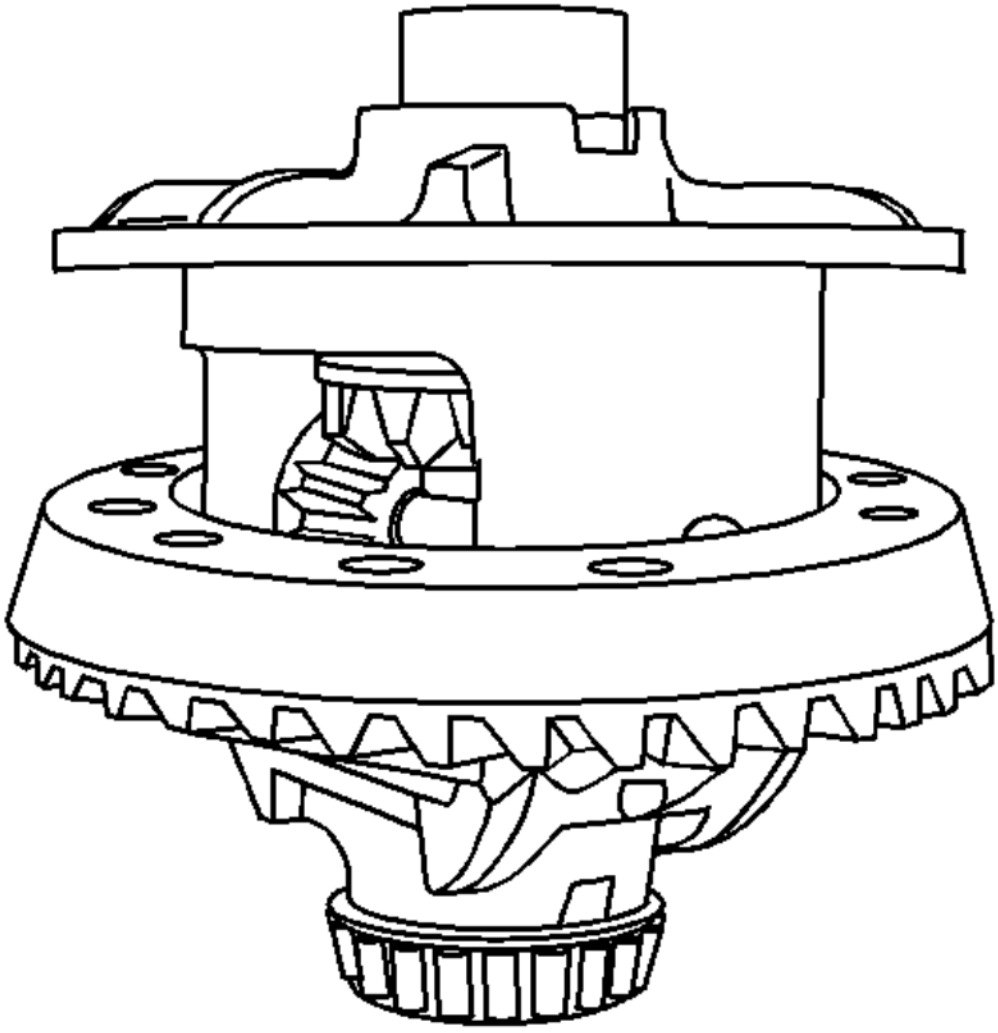


Fig. 151: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

1. Install the ring gear to the differential case.

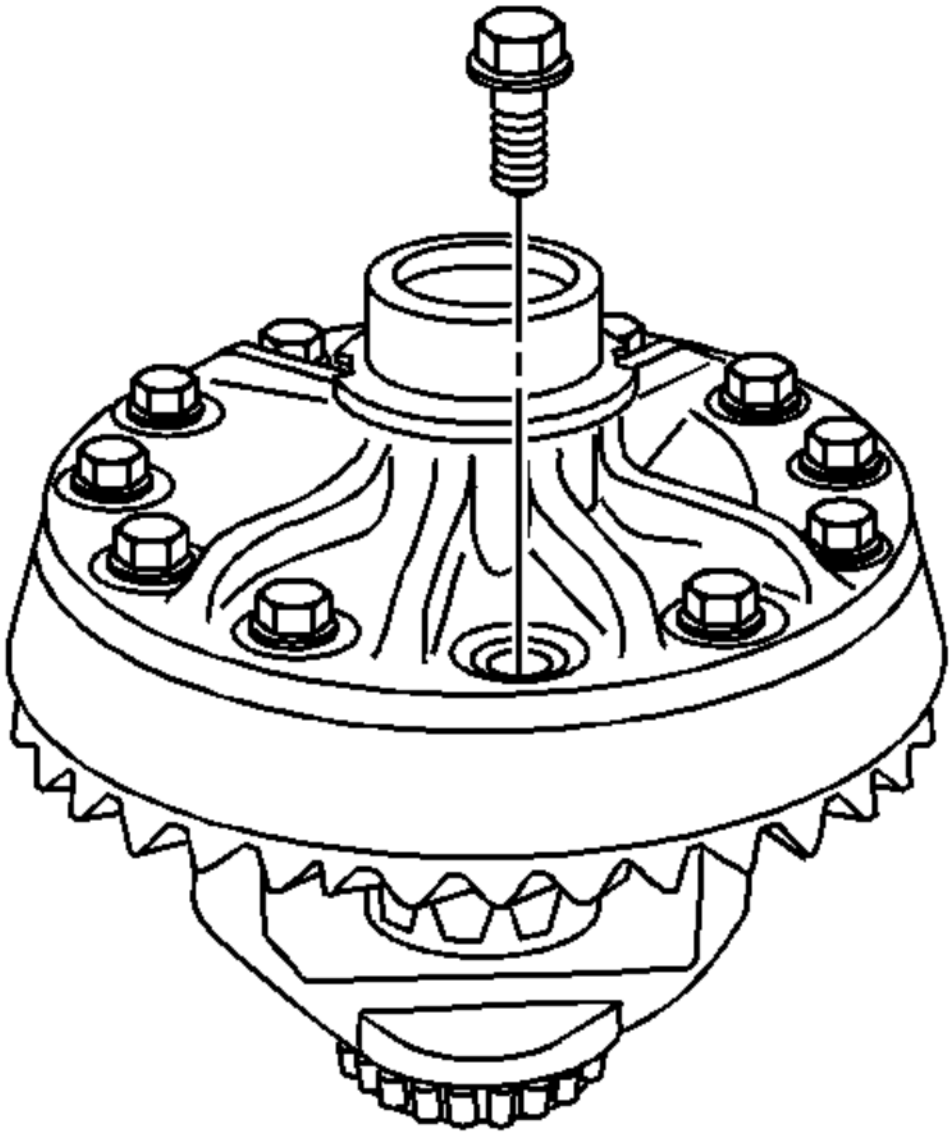


Fig. 152: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts on the 8.6 inch and the 9.5/9.5LD inch axles have left-hand threads. The ring gear bolts on the 11.5 inch axle have right-hand threads.

2. Install the new ring gear bolts.

   Hand start each bolt to ensure that the ring gear is properly installed to the differential case.

   NOTE: Refer to Fastener Notice .

3. Tighten the ring gear bolts, Tighten the ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

   Tighten:

   - For the 8.6 inch axle, tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).
   - For the 9.5/9.5LD inch axles, tighten the ring gear bolts in sequence to 140 N.m (103 lb ft).
   - For the 11.5 inch axle, tighten the ring gear bolts in sequence to 237 N.m (175 lb ft).

4. Install the pinion bearing cups. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
5. Determine the selective shim thickness for the pinion gear. Refer to **Pinion Depth Adjustment (10.5 Inch Axle)** or **Pinion Depth Adjustment (8.6, 9.5/9.5LD, and 11.5 Inch Axles)**.
6. Install the selective shim onto the pinion.
7. Install the inner pinion bearing to the pinion. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
8. Install a new collapsible spacer.
9. Lubricate the pinion bearings with axle lubricant. Refer to **Fluid and Lubricant Recommendations** .
10. Install the outer pinion bearing into the axle housing.
11. Install the new pinion oil seal. Refer to **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (All Except 9.75 Inch Axle)** or **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (8.6 Inch Axle w/Drum Brakes)**.
12. Install the pinion into the axle housing.
13. Install the pinion yoke. Refer to **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (All Except 9.75 Inch Axle)** or **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (8.6 Inch Axle w/Drum Brakes)**.
14. Install the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch**

Axles) or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.

15. Fill the axle with lubricant. Use the proper fluid. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
16. Lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.
3. Remove the pinion gear bearing retainer. Refer to **Drive Pinion Housing and/or Seal Replacement**.
4. Remove the pinion and the pinion bearings. Refer to **Drive Pinion Housing and/or Seal Replacement**.

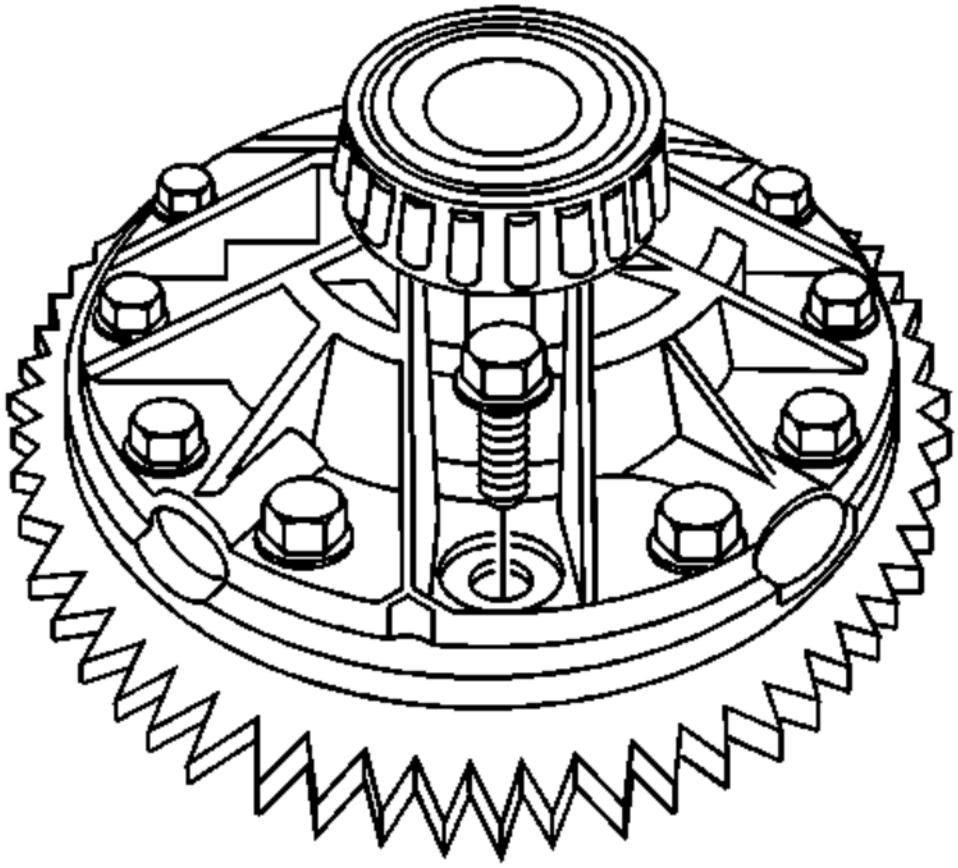


Fig. 153: Ring Gear Bolts (10.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

5. Remove the ring gear bolts. Discard the bolts.

NOTE: **Refer to Ring Gear Removal Notice .**

6. Remove the ring gear from the differential. Drive the gear off with a brass drift if necessary.

Installation Procedure

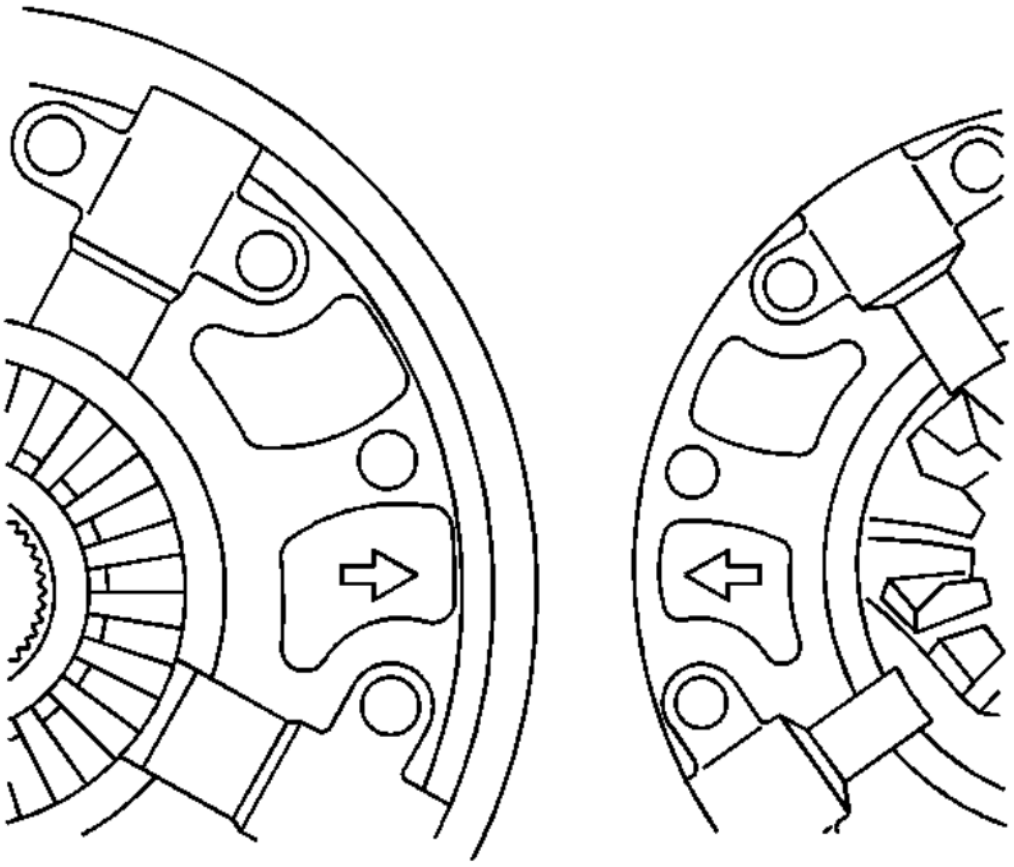


Fig. 154: Aligning Differential Case Arrows
Courtesy of GENERAL MOTORS CORP.

1. If the differential case has become separated, assemble the differential case by aligning the two arrows inside the differential case as shown.

IMPORTANT: The mating surface of the ring gear and the differential case must be clean and free of burrs before installing the ring gear.

2. Install the ring gear to the differential case.

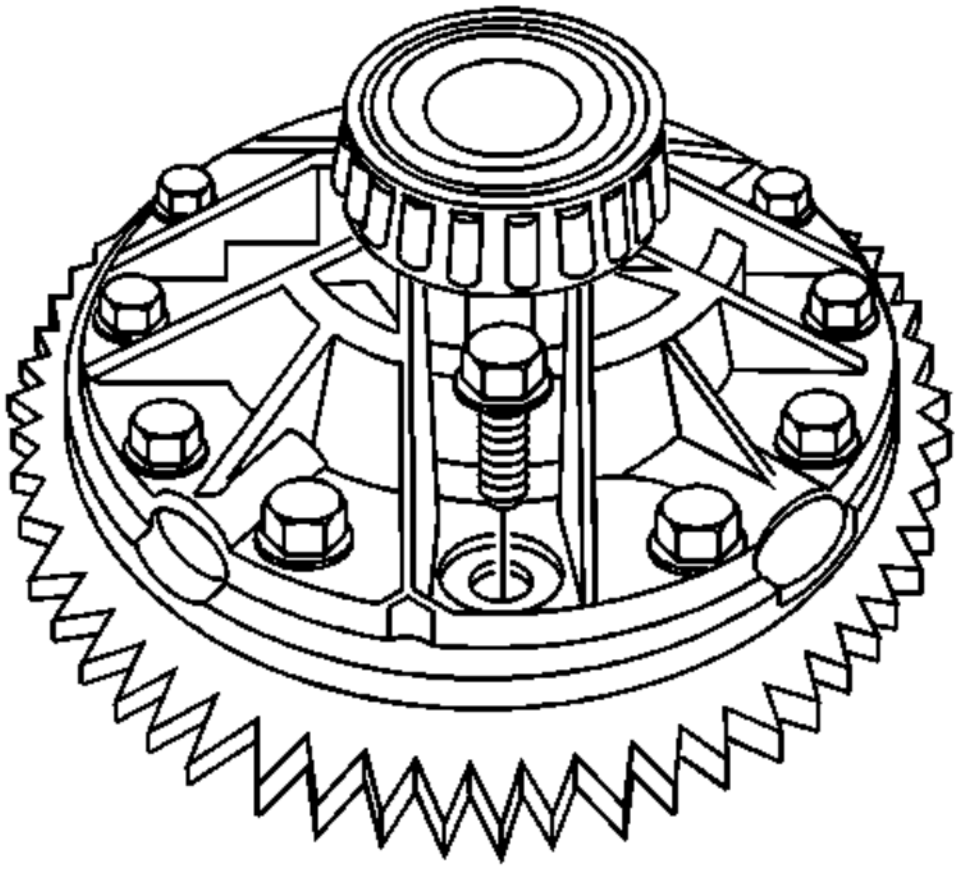


Fig. 155: Ring Gear Bolts (10.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

3. Install the new ring gear bolts.

   Hand start each bolt to ensure that the ring gear is properly installed to the differential case.

   NOTE: Refer to Fastener Notice .

4. Tighten the new ring gear bolts. Tighten the ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

   Tighten: Tighten the ring gear bolts in sequence to 165 N.m (122 lb ft).

5. Install the pinion and the pinion bearings. Refer to **Drive Pinion Housing and/or Seal Replacement**.
6. Install the pinion gear bearing retainer. Refer to **Drive Pinion Housing and/or Seal Replacement**.
7. Install the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.
8. Fill the axle with lubricant. Use the proper fluid. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
9. Lower the vehicle.

DRIVE PINION BEARINGS REPLACEMENT (8.6, 9.5, 11.5 INCH AXLE)

Tools Required

- **J 7818** Inner Bearing Race Installer. See **Special Tools**.
- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 8611-01** Rear Pinion Bearing Race Installer. See **Special Tools**.
- **J 8614-01** Flange and Pulley Holding Tool
- **J 22306** Pinion Cup Bearing Installer - Rear. See **Special Tools**.
- **J 22912-B** Split Plate Bearing Puller
- **J 22828** Input/Counterbalance Race Installer
- **DT-47688** Pinion Bearing Remover, 8. See **Special Tools**.6 Inch Axle Installer
- **J 36614** Inner Pinion Bearing Installer
- **J 45870** Pinion Bearing Cup Installer. See **Special Tools**.

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.
3. Remove the drive pinion from the axle. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

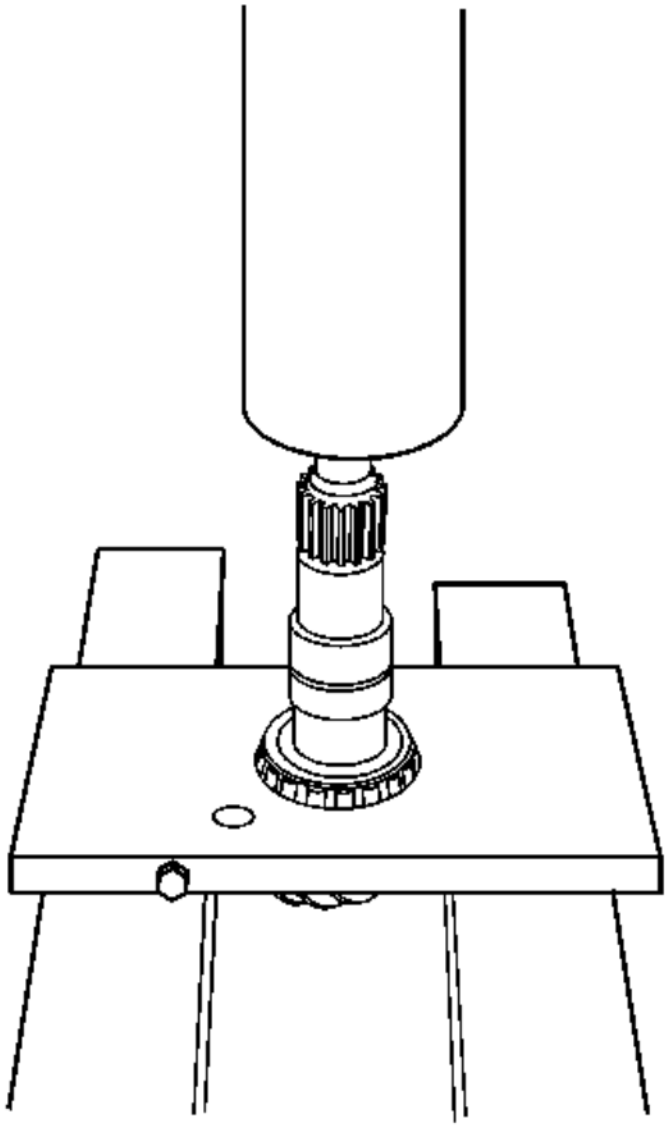


Fig. 156: Removing Bearing From Drive Pinion
Courtesy of GENERAL MOTORS CORP.

4. Using the **DT-47688** and a press, remove the bearing from the drive pinion. See **Special Tools**.
5. Remove the shim.

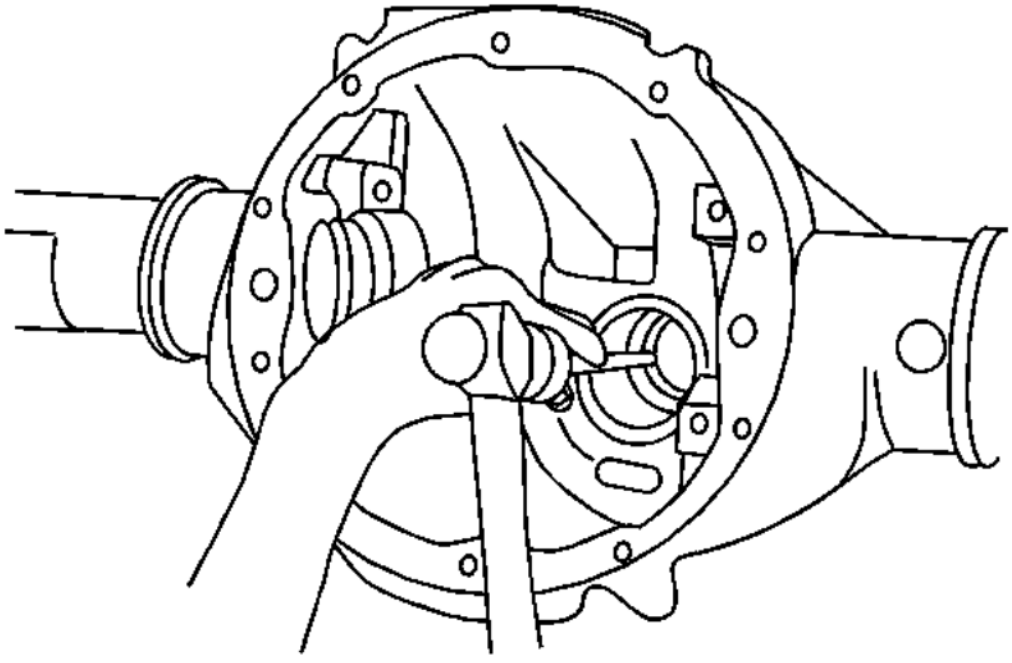


Fig. 157: Removing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

6. Remove the outer pinion bearing cup from the axle housing using a hammer and a brass drift in the slots provided. Move the drift back and forth between one side of the cup and the other in order to work the cups out of the housing evenly.

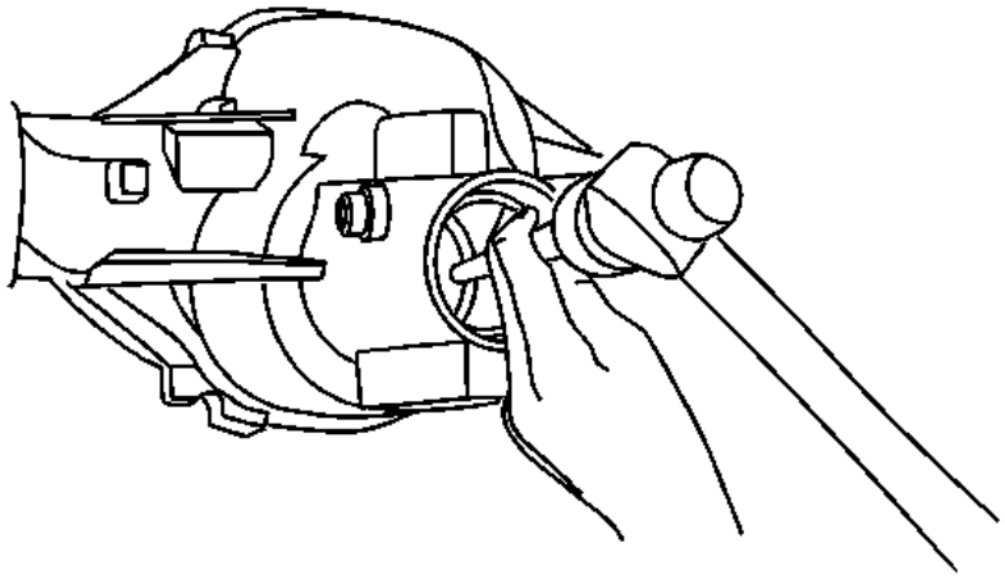


Fig. 158: Removing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

7. Remove the inner pinion bearing cup from the axle housing using a hammer and a brass drift in the slots provided. Move the drift back and forth between one side of the cup and the other in order to work the cups out of the housing evenly.

Installation Procedure

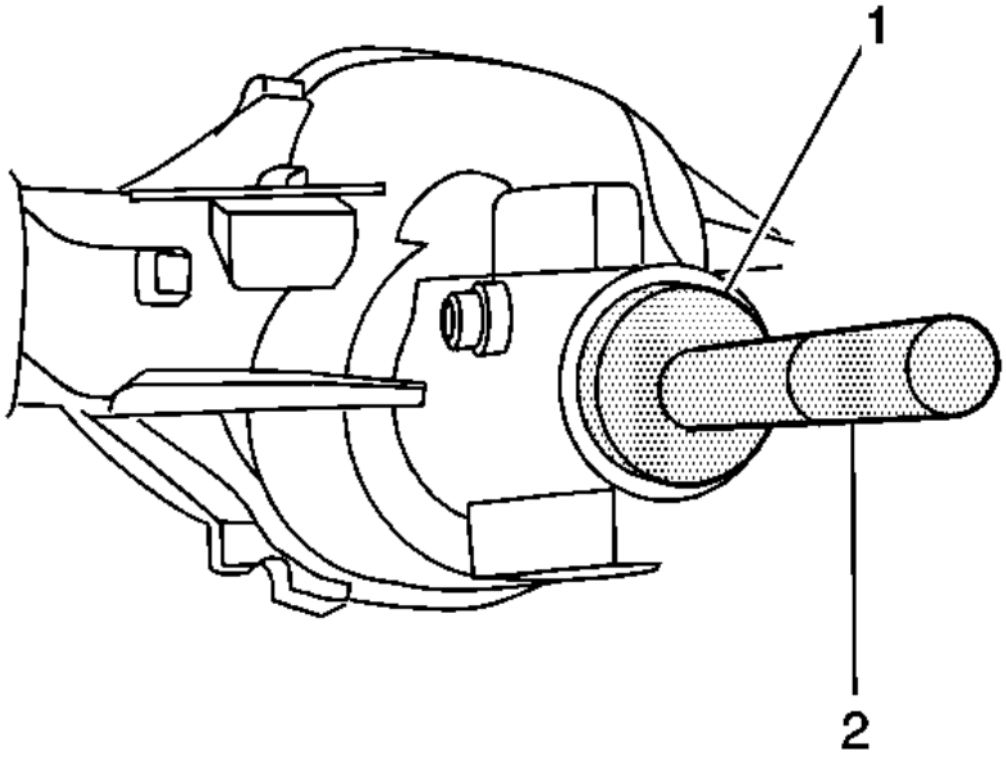


Fig. 159: Installing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

1. Install the outer pinion bearing cup using the **J 8611-01** , 8. See **Special Tools**.6 inch axle, or the **J 7818** , 9. See **Special Tools**.5/9.5LD inch axle (1), and the **J 8092** (2).

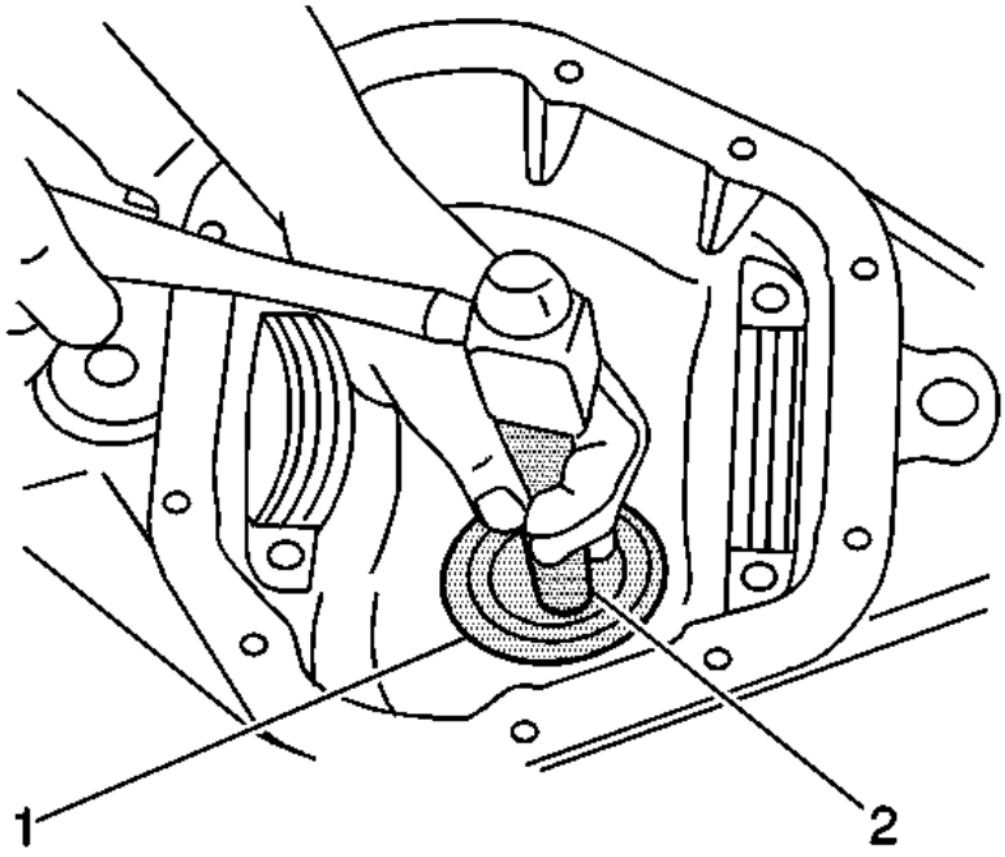


Fig. 160: Installing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

2. Install the inner pinion bearing cup using the **J 45870** , 8. See **Special Tools**.6 inch axle, or the **J 22306** , 9. See **Special Tools**.5/9.5LD inch axle (2), and the **J 8092** (1).
3. Determine the selective shim thickness for the drive pinion. Refer to **Pinion Depth Adjustment (10.5 Inch Axle)** or **Pinion Depth Adjustment (8.6, 9.5/9.5LD, and 11.5 Inch Axles)**.
4. Install the selective shim between the inner pinion bearing and the shoulder on the gear.

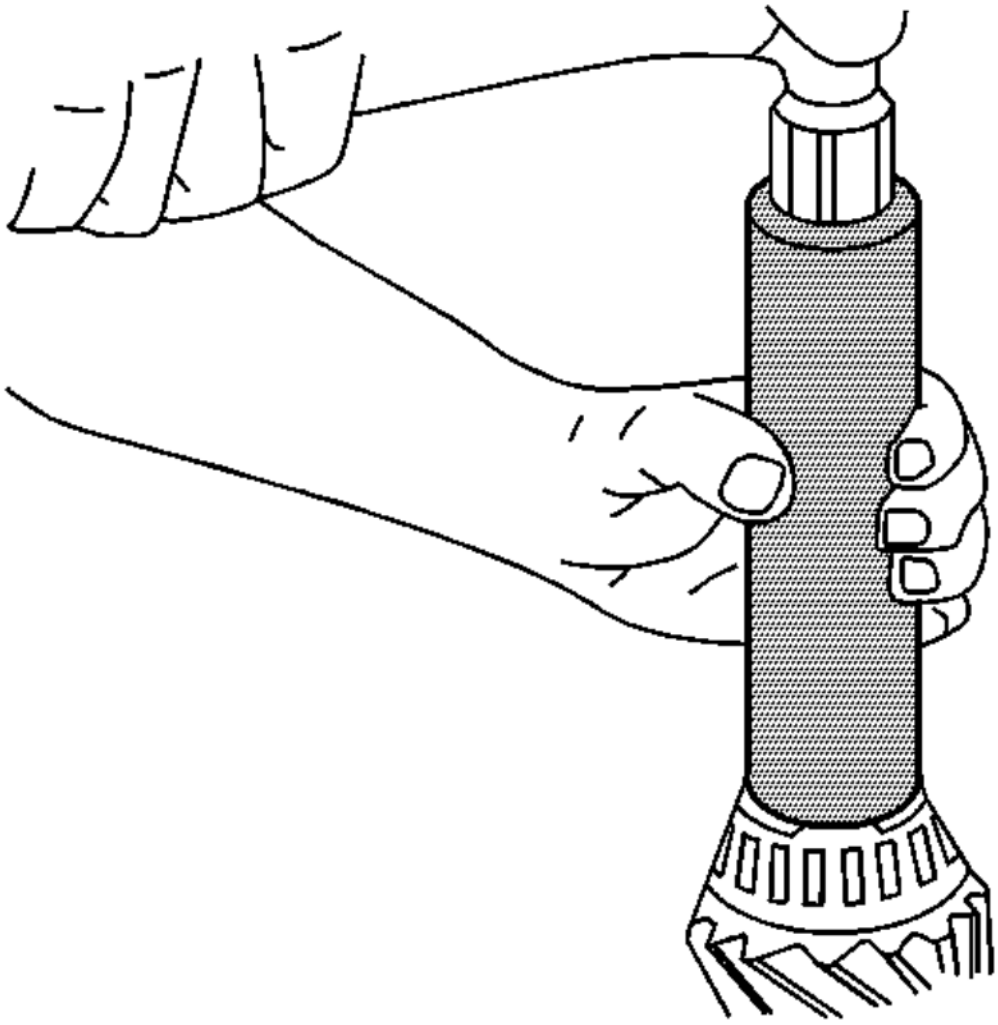


Fig. 161: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS CORP.

5. Install the inner pinion bearing using the **J 24433** or the **J 36614** . See **Special Tools**.

   Press the bearing on until the cone seats on the pinion shim.

6. Install a new collapsible spacer.
7. Lubricate the pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and**

Lubricant Recommendations .

8. Install the outer pinion bearing into the axle housing.

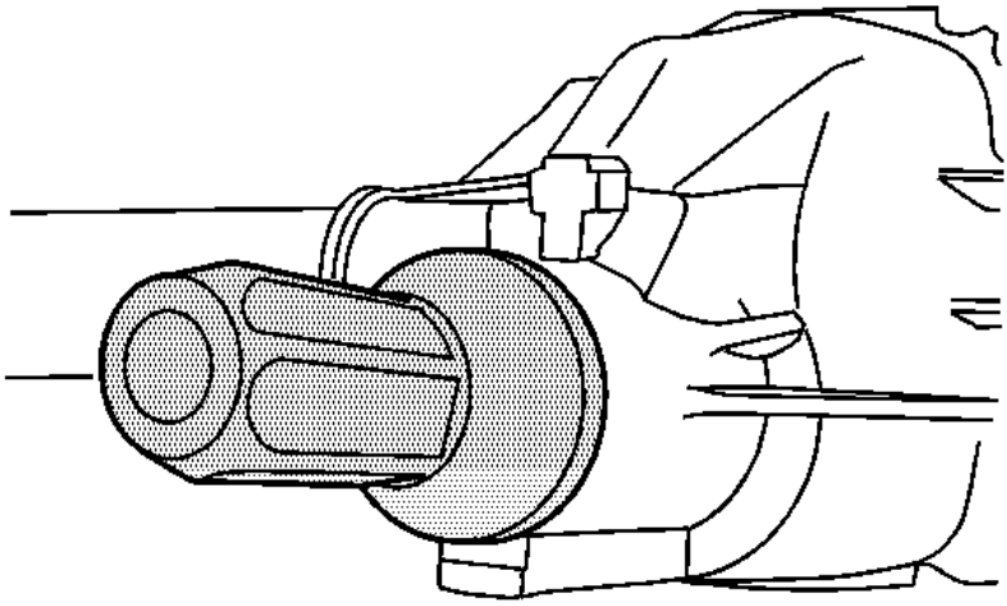


Fig. 162: Installing New Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

9. Install a new pinion oil seal using the **J 22388** . See **Special Tools**.
10. Install the pinion into the axle housing.
11. Apply sealant, GM P/N 12346004 (Canadian P/N 10953480) or equivalent, to the splines of the pinion yoke.

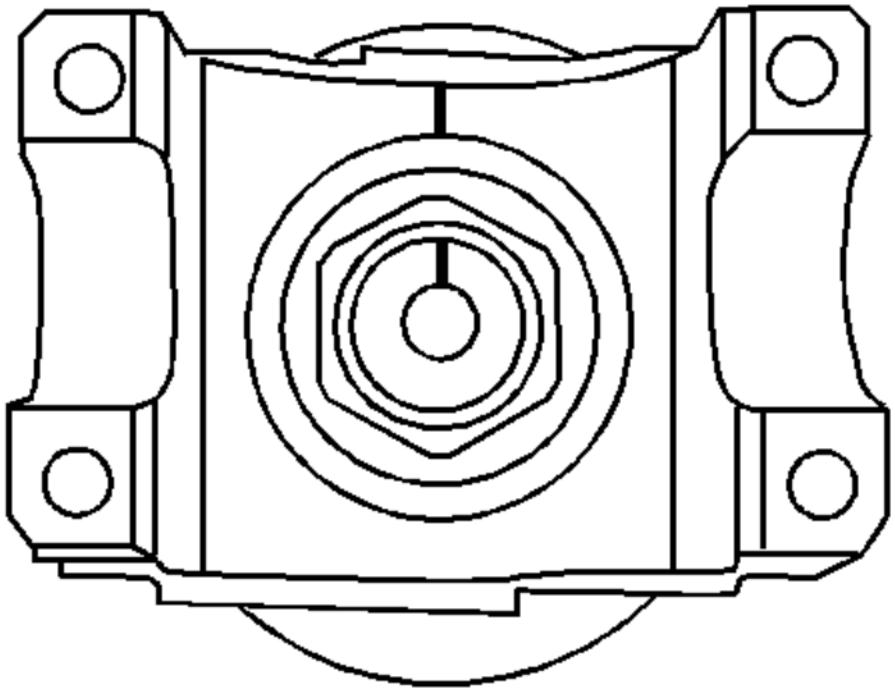


Fig. 163: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

12. Install the pinion yoke.

    Align the marks made during removal.

NOTE: Refer to Pinion Flange/Yoke Installation Notice .

13. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer until a few threads show through the yoke.
14. Install the washer and a new pinion nut.

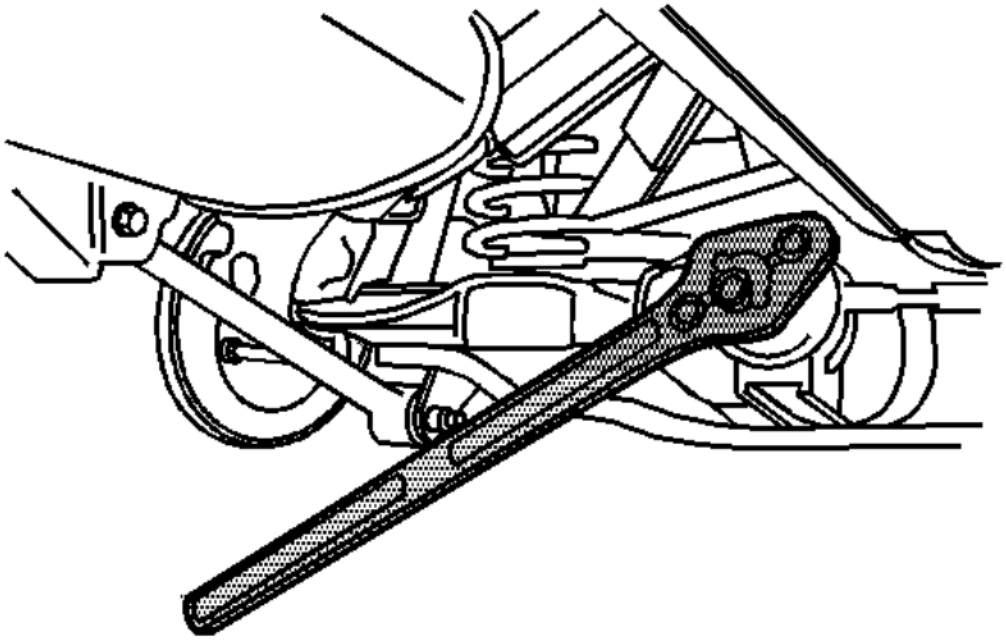


Fig. 164: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

15. Install the **J 8614-01** onto the pinion yoke as shown.

NOTE: Refer to Fastener Notice .

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

16. Tighten the pinion nut while holding the **J 8614-01** .

Tighten: Tighten the pinion nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

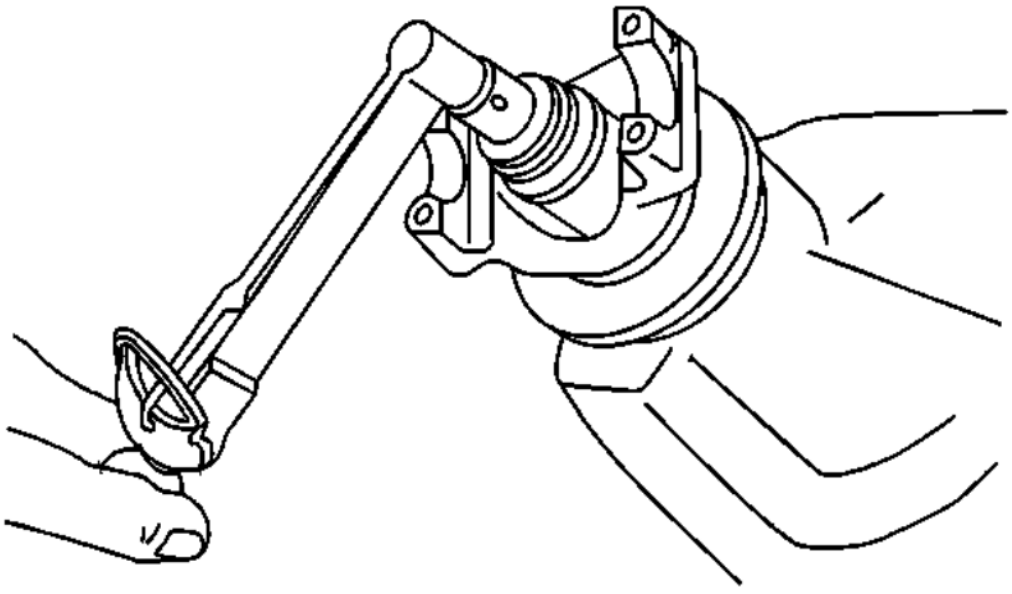


Fig. 165: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

17. Measure the rotating torque of the pinion using an inch-pound torque wrench.

    Specification: The rotating torque of the pinion should be between 1.0-2.3 N.m (10-20 lb in) for used bearings, or 1.7-3.4 N.m (15-30 lb in) for new bearings.

18. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings, or 1.7 N.m (15 lb in) for new bearings, continue to tighten the pinion nut.

    Tighten: Tighten the pinion nut, in small increments, as needed, until the torque required in order to rotate the pinion is between 1.0-2.3 N.m (10-20 lb in) for used bearings, or 1.7-3.4 N.m (15-30 lb in) for new bearings.

19. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated.

    Recheck the rotating torque and adjust if necessary.

20. Install the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch**

Axles) or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.

21. Fill the axle with lubricant. Use the proper fluid. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
22. Lower the vehicle.

DRIVE PINION BEARINGS REPLACEMENT (10.5 INCH AXLE)

Tools Required

- **J 22761** Differential Side Bearing Installer
- **J 8614-01** Flange and Pulley Holding Tool
- **J 37624** Pinon Bearing Installer. See **Special Tools**.
- **J 24433** Pinion Cone and Side Bearing Installer. See **Special Tools**.
- **J 22912-B** Split Plate Bearing Puller
- **J 44414** Rear Axle Pinion Oil Seal Installer. See **Special Tools**.
- **J 8608** Rear Pinion Bearing Installer. See **Special Tools**.
- **J 8092** Universal Driver Handle - 3/4 in - 10

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.
3. Remove the pinion gear bearing retainer. Refer to **Drive Pinion Housing and/or Seal Replacement**.
4. Remove the pinion yoke and the oil seal. Refer to **Drive Pinion Housing and/or Seal Replacement**.
5. Remove the outer pinion bearing.

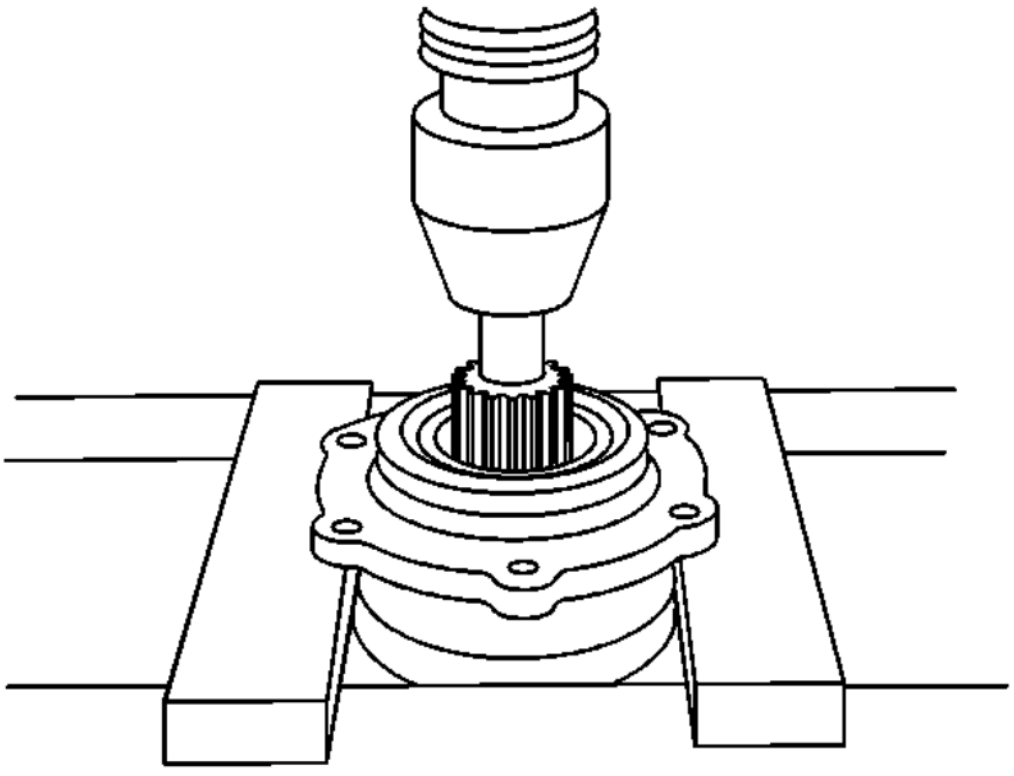


Fig. 166: Removing Pinion
Courtesy of GENERAL MOTORS CORP.

6. Remove the pinion.

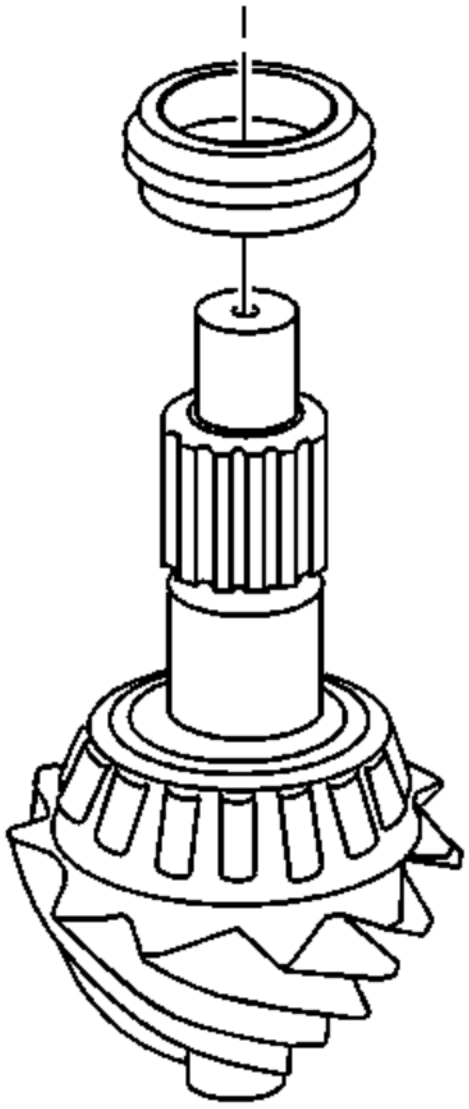


Fig. 167: View Of Collapsible Spacer
Courtesy of GENERAL MOTORS CORP.

7. Remove the collapsible spacer.

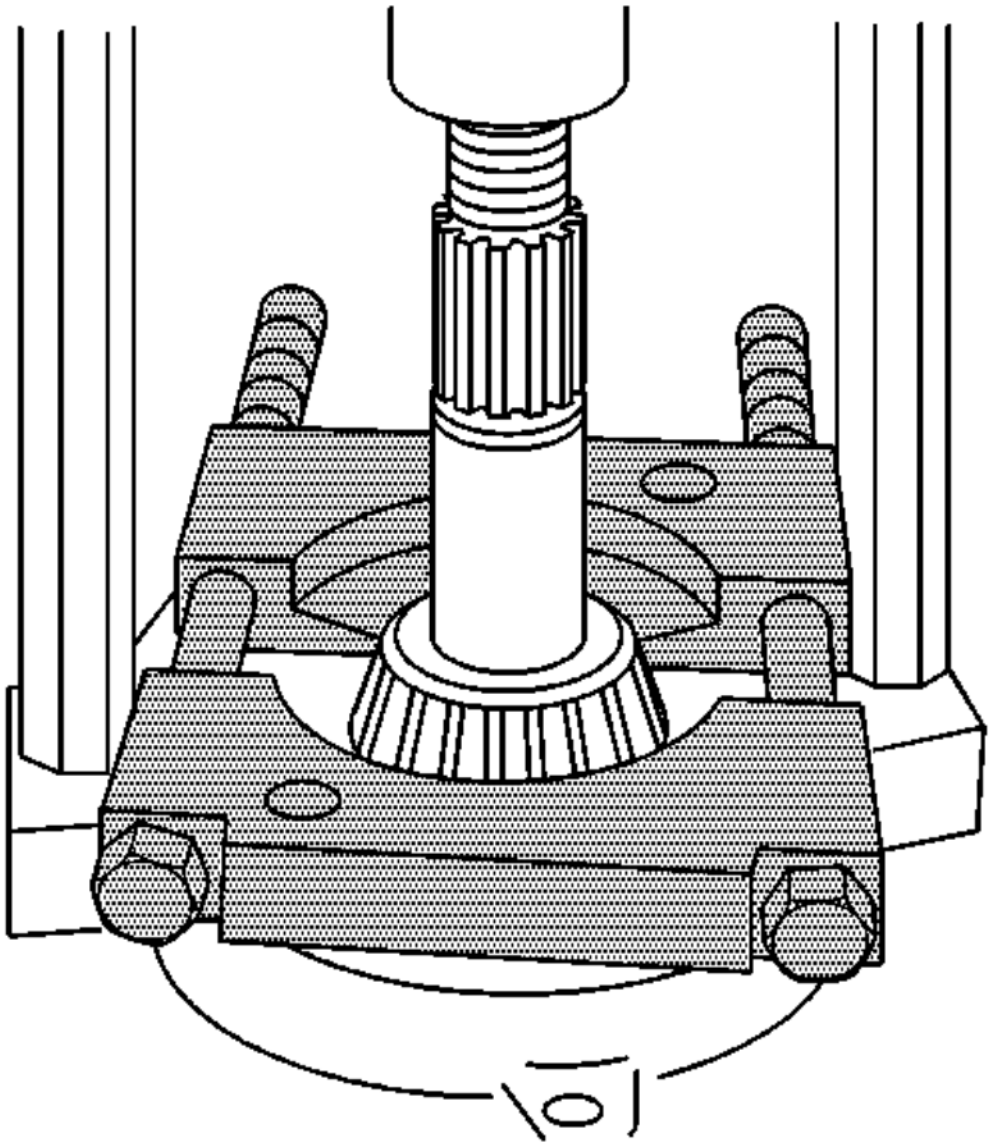


Fig. 168: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

8. Using the **J 22912-B** and a hydraulic press, remove the inner pinion bearing from the pinion.

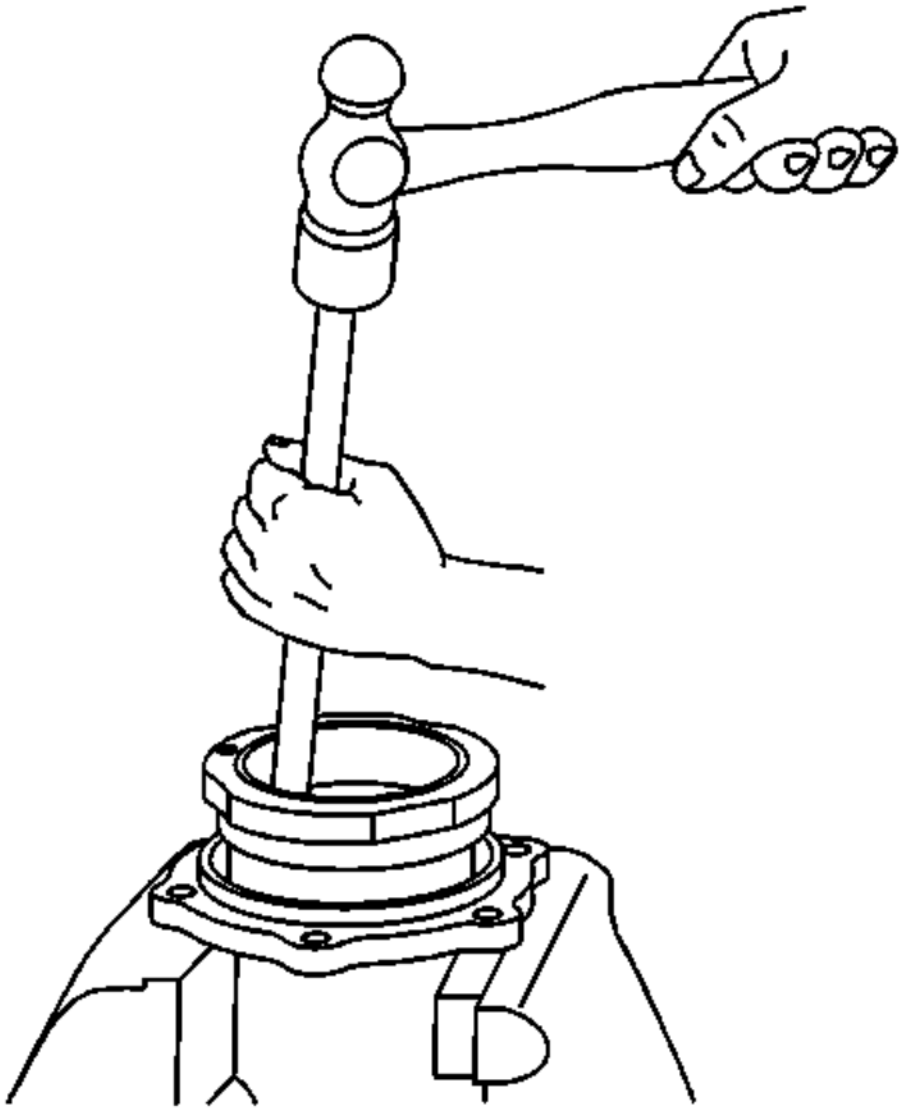


Fig. 169: Removing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Insert the brass drift in the slots to remove the bearing cup.

IMPORTANT: Move the drift back and forth between one side of the cup

and the other in order to work the cups out of the retainer evenly.

9. Using a hammer and a brass drift, remove the outer pinion bearing cup.

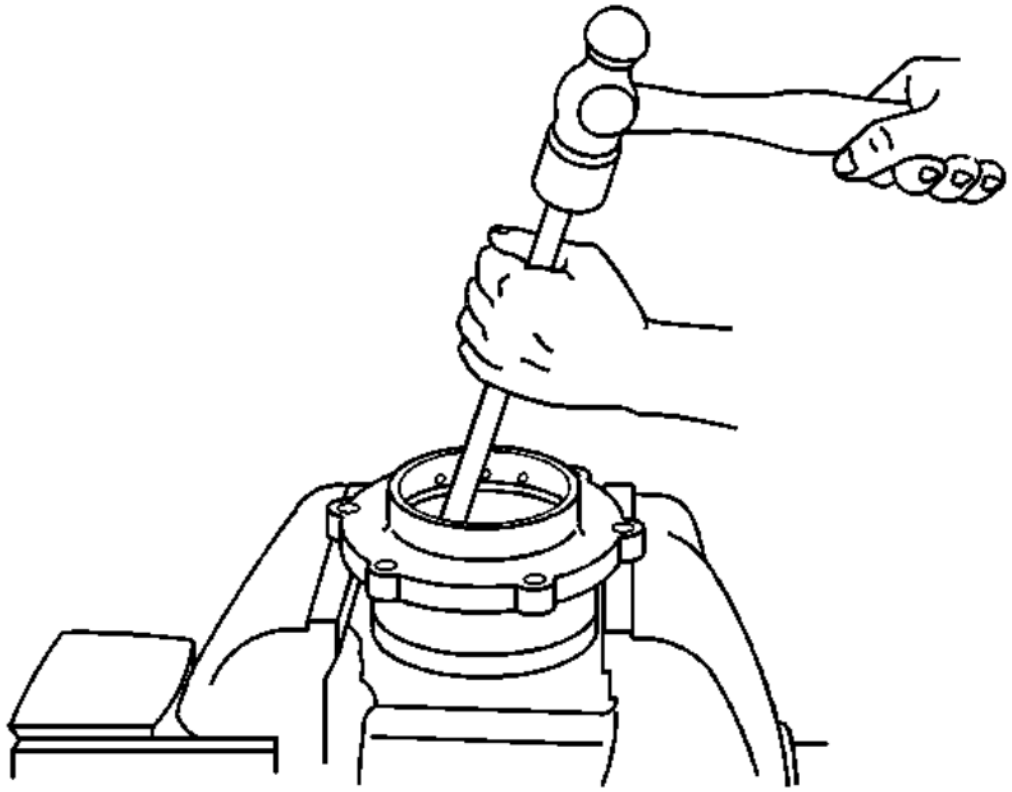


Fig. 170: Removing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Insert the brass drift in the slots to remove the bearing cup.

IMPORTANT: Move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.

10. Using a hammer and a brass drift, remove the inner pinion bearing cup.

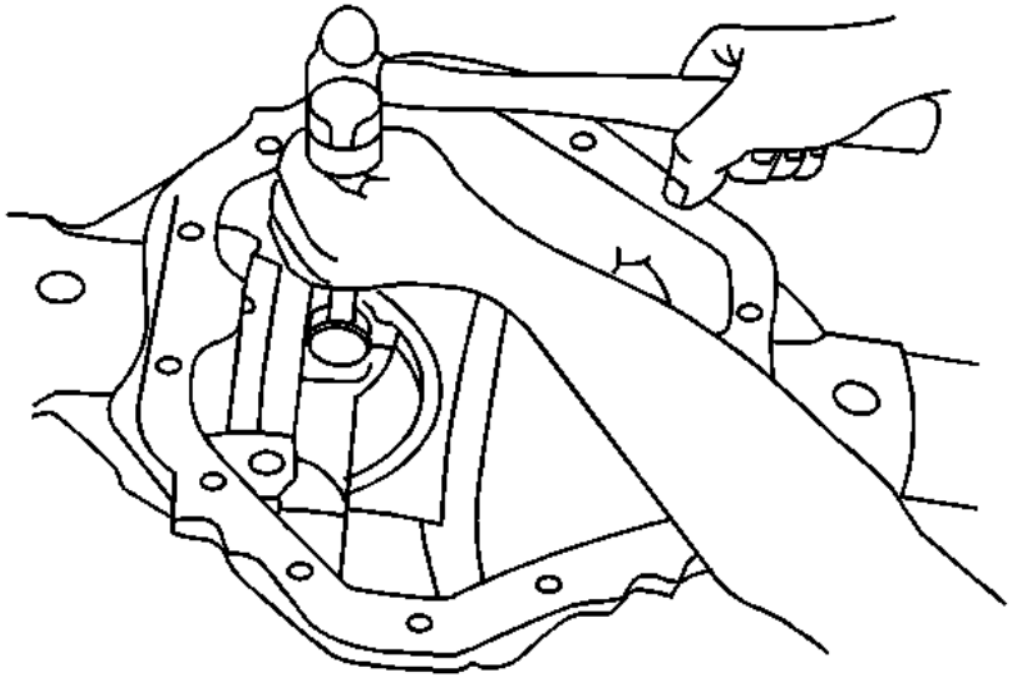


Fig. 171: Removing Pinion Gear Pilot Bearing
Courtesy of GENERAL MOTORS CORP.

11. Using a brass drift and a hammer, remove the pinion gear pilot bearing.

Installation Procedure

1. Using the **J 22761** , install the pinion gear pilot bearing.

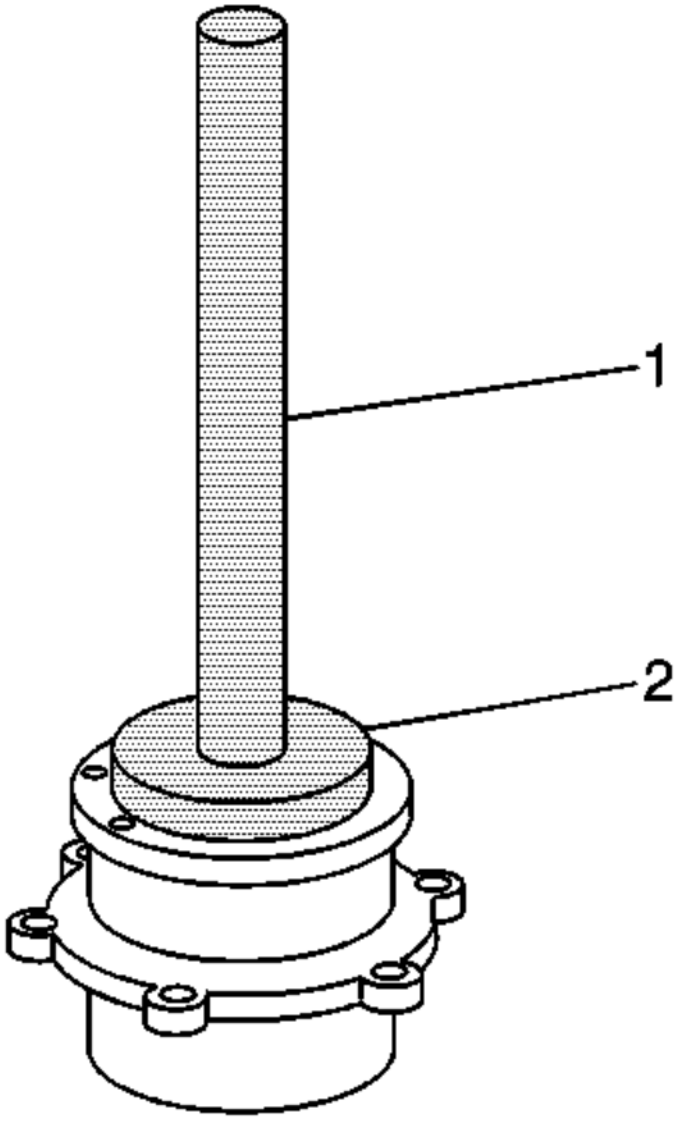


Fig. 172: Installing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

2. Using the **J 37624** (2) and the **J 8092** (1), install the inner pinion bearing cup in the pinion gear bearing retainer.

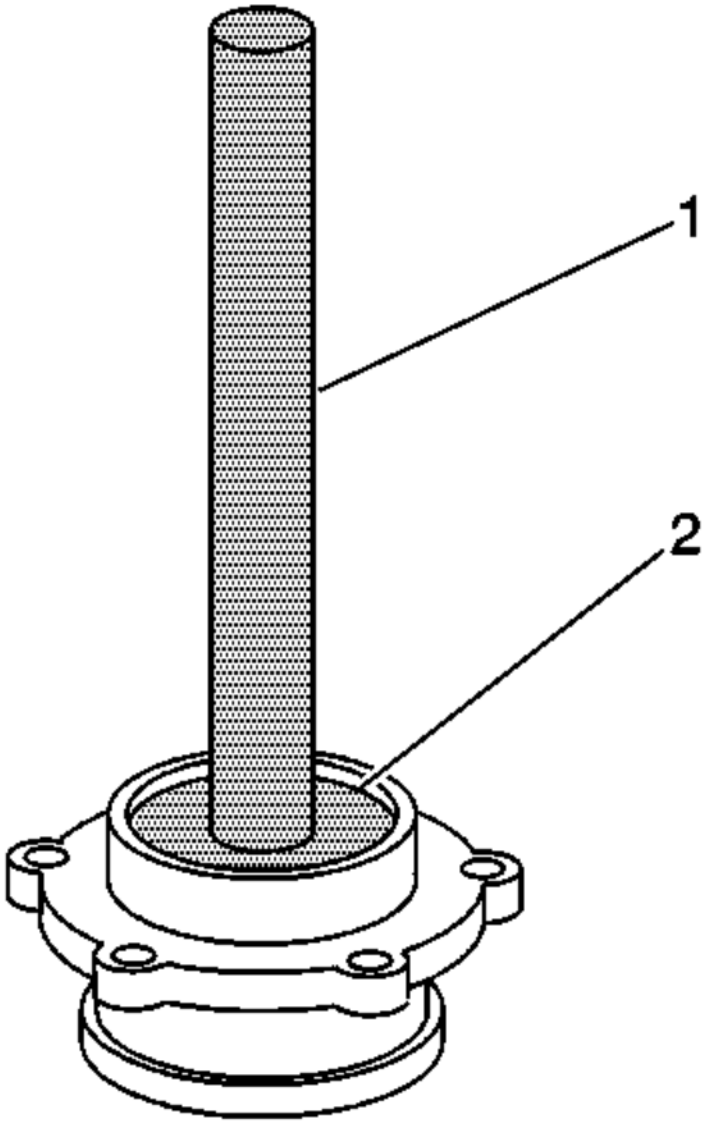


Fig. 173: Installing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

3. Using the **J 8608** (2) and the **J 8092** (1), install the outer pinion bearing cup in the pinion gear bearing retainer.

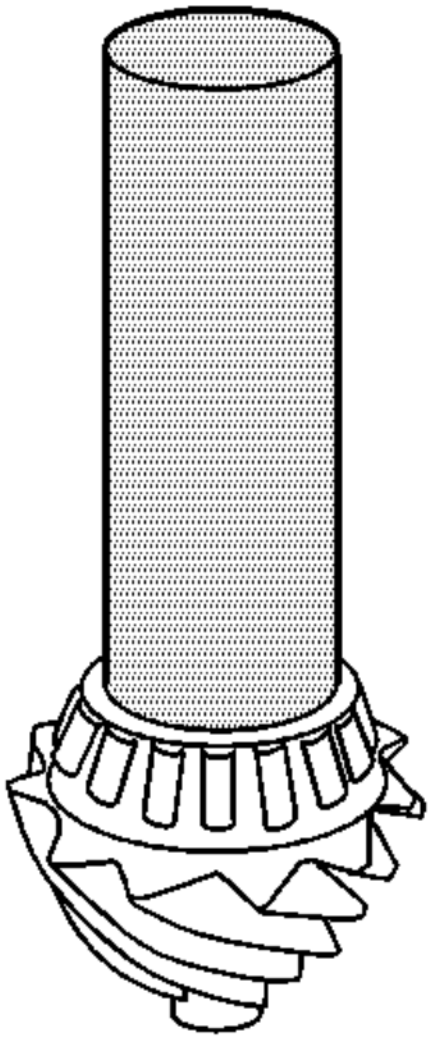


Fig. 174: Installing Inner Pinion Bearing Using J 24433
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Press the bearing on until the cone seats on the pinion.

4. Using the **J 24433** and a hydraulic press, install the inner pinion bearing. See **Special Tools**.
5. Install the new collapsible spacer.
6. Lubricate the pinion bearings with axle lubricant. Refer to **Fluid and Lubricant**

Recommendations .

7. Install the outer pinion bearing into the pinion bearing retainer.
8. Using the **J 44414** , install the new pinion oil seal. See **Special Tools**.

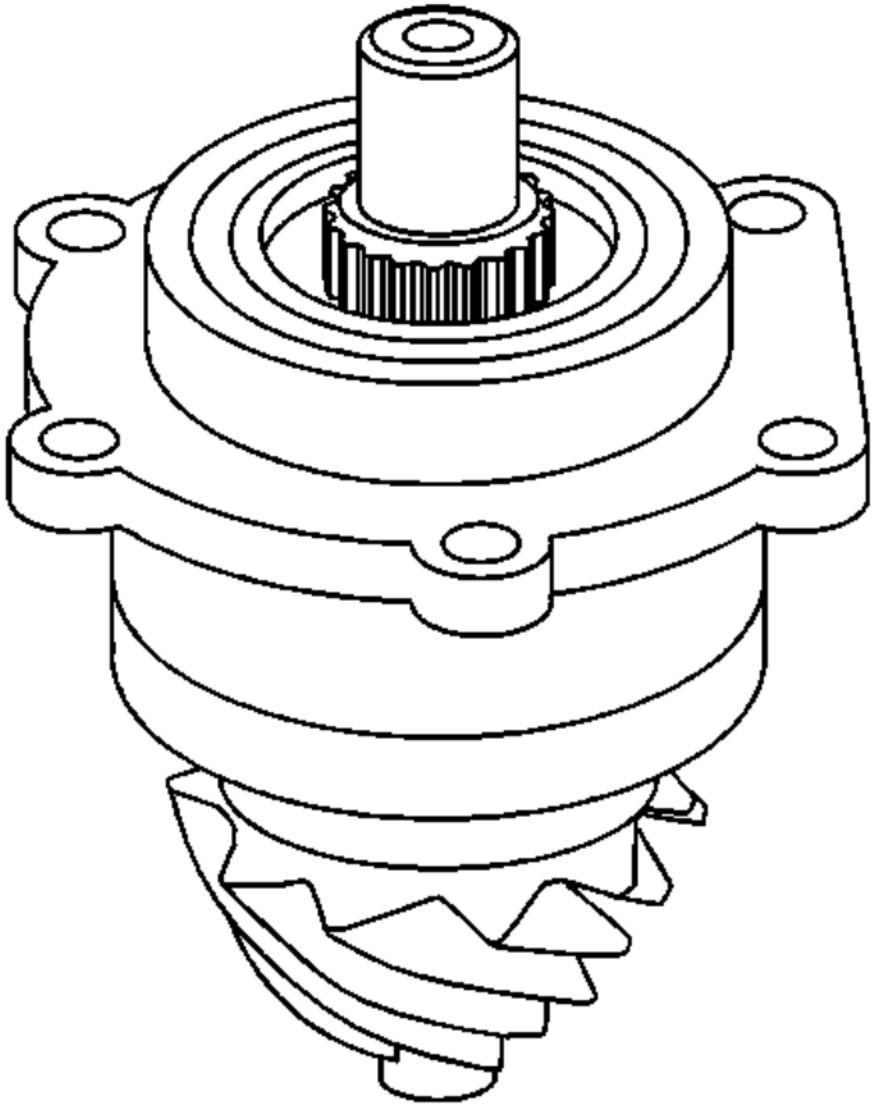


Fig. 175: Pinion Retainer
Courtesy of GENERAL MOTORS CORP.

9. Install the pinion in the pinion gear bearing retainer.
10. Apply sealant, GM P/N 12346004 (Canadian P/N 10953480) or equivalent, to the splines of the pinion yoke.

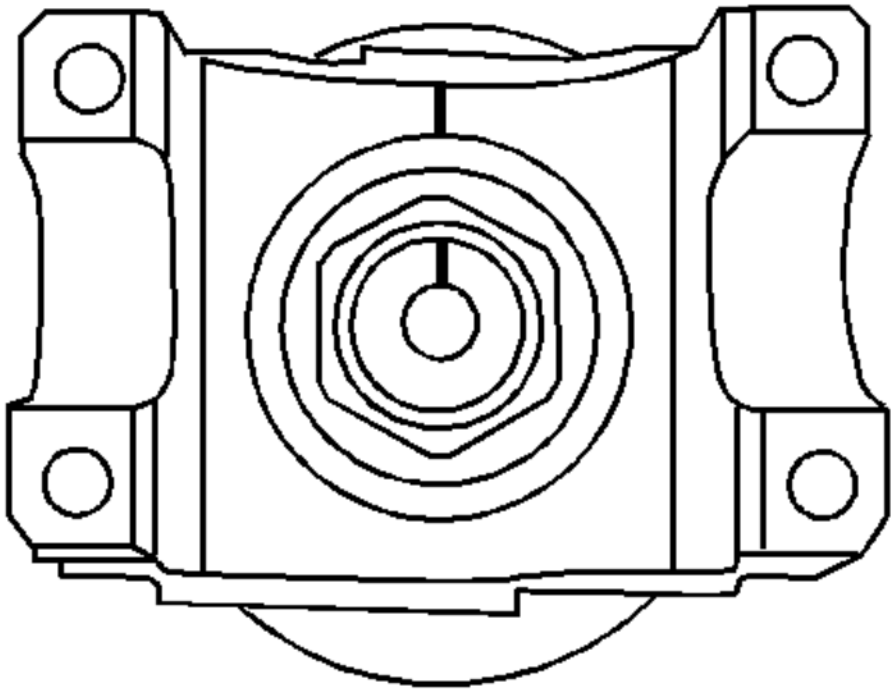


Fig. 176: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

11. Align the marks made during removal.
12. Install the pinion yoke.

NOTE: Refer to Pinion Flange/Yoke Installation Notice .

13. Using a soft-faced hammer, tap the pinion yoke until a few threads show through the yoke.
14. Install the washer and the new pinion nut.

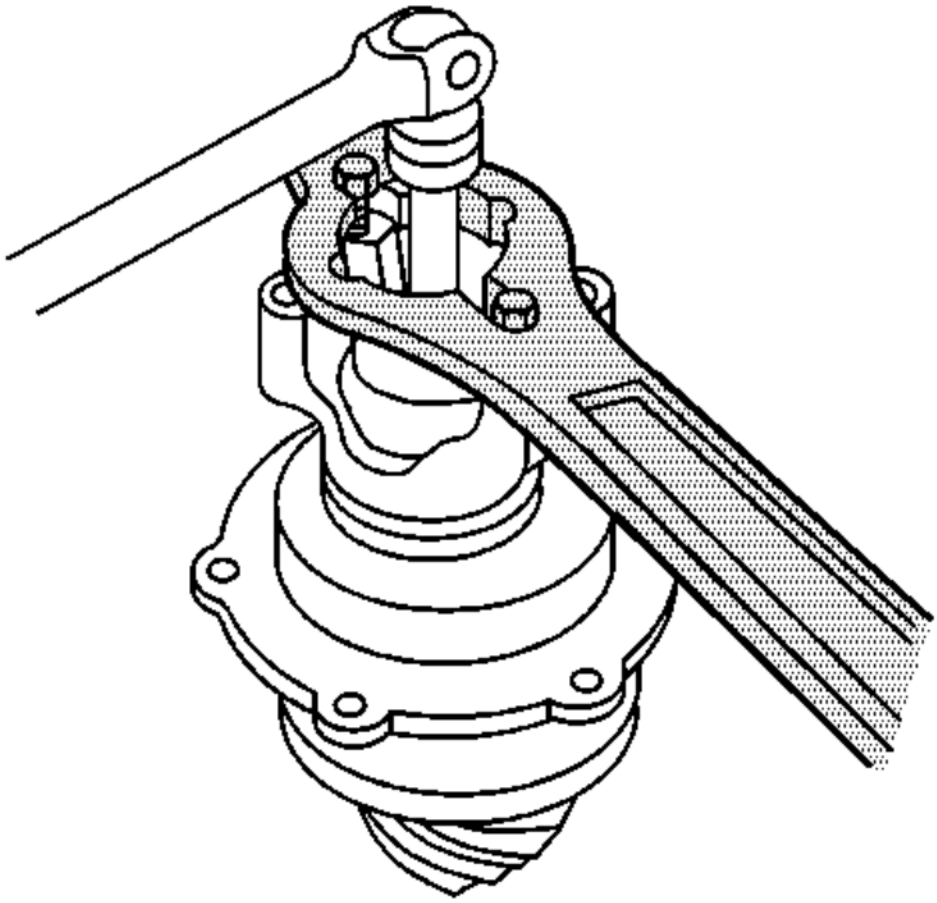


Fig. 177: Installing J 8614-01 To Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

15. Install the **J 8614-01** on the pinion yoke.

NOTE: Refer to Fastener Notice .

IMPORTANT: If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.

16. Tighten the pinion nut while holding the **J 8614-01** .

Tighten: Tighten the pinion nut until the pinion end play is just taken up. Rotate the pinion while tightening the nut to seat the bearings.

17. Remove the **J 8614-01** .

IMPORTANT: Do not apply sealant to the pinion gear bearing retainer at this time.

18. Install the original shim to the pinion bearing retainer. If the original shim is not available, install a 0.41 mm (0.016 in) shim to build pinion depth.
19. Install the pinion gear bearing retainer to the axle housing.
20. Install the pinion bearing retainer bolts.

Tighten: Tighten the pinion gear retainer bolts to 88 N.m (65 lb ft).

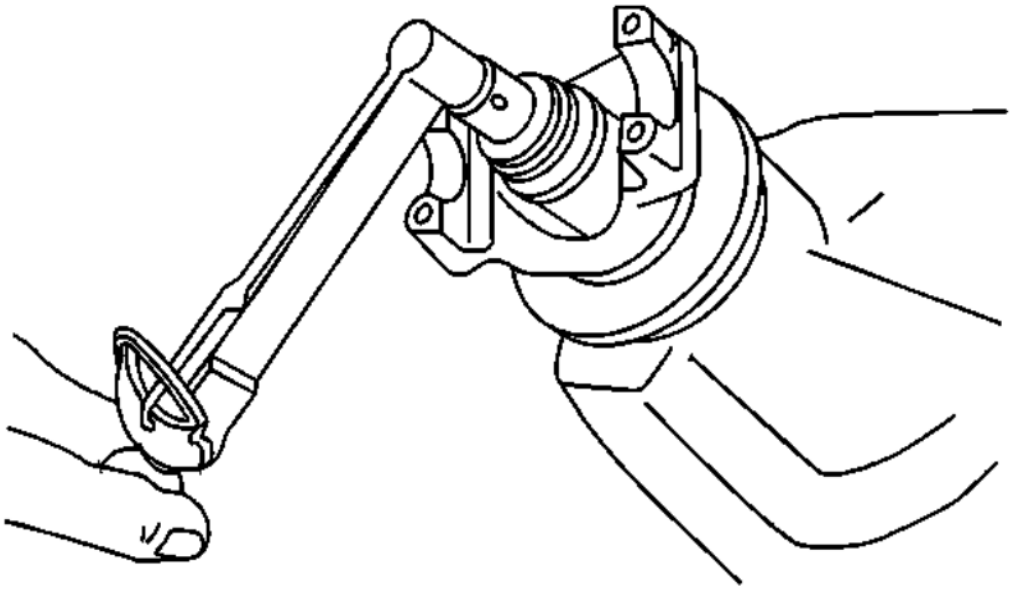


Fig. 178: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

21. Using an inch-pound torque wrench, measure the rotating torque of the pinion.

Specification: The rotating torque of the pinion should be between 1.0-2.3 N.m (10-20 lb in) for used bearings, or 1.7-3.4 N.m (15-30 lb in) for new bearings.

22. If the rotating torque measurement is below 1.0 N.m (10 lb in) for used bearings, or 1.7 N.m (15 lb in) for new bearings, install the **J 8614-01** and continue to tighten the pinion nut.

    Tighten: Tighten the pinion nut, in small increments, as needed, until the torque required in order to rotate the pinion is between 1.0-2.3 N.m (10-20 lb in) for used bearings, or 1.7-3.4 N.m (15-30 lb in) for new bearings.

23. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated.

    Recheck the rotating torque and adjust if necessary.

24. Install the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.
25. Adjust the differential side bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (10.5 Inch, 11.5 Inch Axles)** or **Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Carrier Bearing Preload Adjustment (9.5, and 9.5LD Inch Axles)**.
26. Determine the selective shim thickness for the drive pinion. Refer to **Pinion Depth Adjustment (10.5 Inch Axle)** or **Pinion Depth Adjustment (8.6, 9.5/9.5LD, and 11.5 Inch Axles)**.
27. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
28. Fill the axle with lubricant. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
29. Lower the vehicle.

DIFFERENTIAL REPLACEMENT (8.6, 9.5/9.5LD INCH AXLES)

Tools Required

J 24429 Side Bearing Backlash Spanner. See **Special Tools**.

Removal Procedure

IMPORTANT: Group and mark the shims together as originally removed. If you

remove or replace the ring and pinion gear set, perform the bearing preload, backlash, and gear tooth contact pattern check in order to ensure proper contact of the gears. If you reinstall or replace the differential carrier without replacing any other component (i.e. pinion and ring gear set, bearings. etc.) then you may reinstall the carrier with the original shims in their original locations. Always perform a gear tooth contact pattern check, even when you remove only the carrier.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)**.

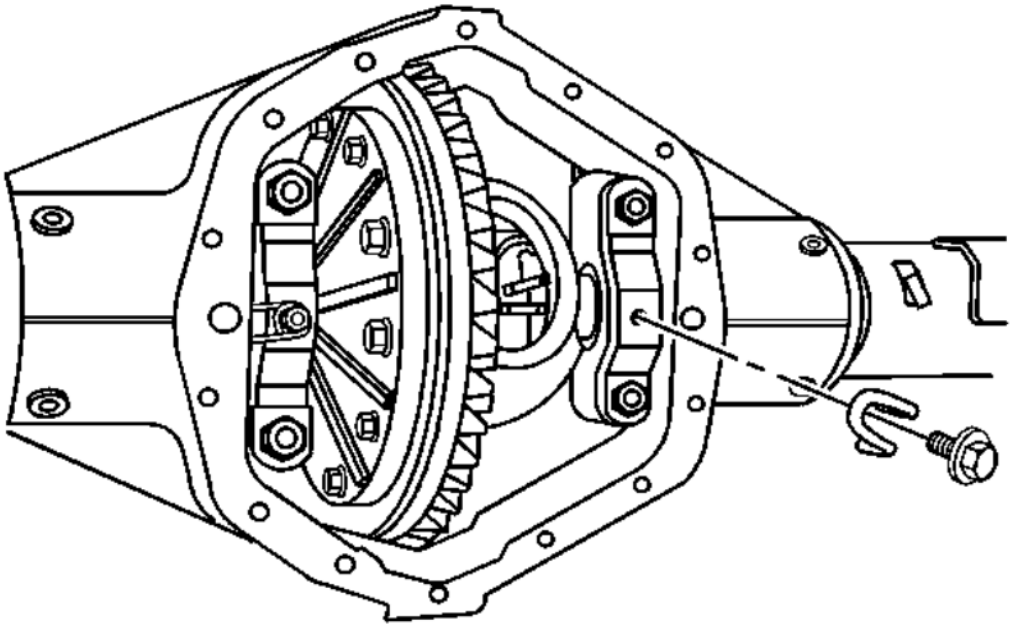


Fig. 179: Differential Bearing Adjuster Nut Lock
Courtesy of GENERAL MOTORS CORP.

3. Remove the differential bearing adjuster nut lock (9.5/9.5LD inch axle - right side).

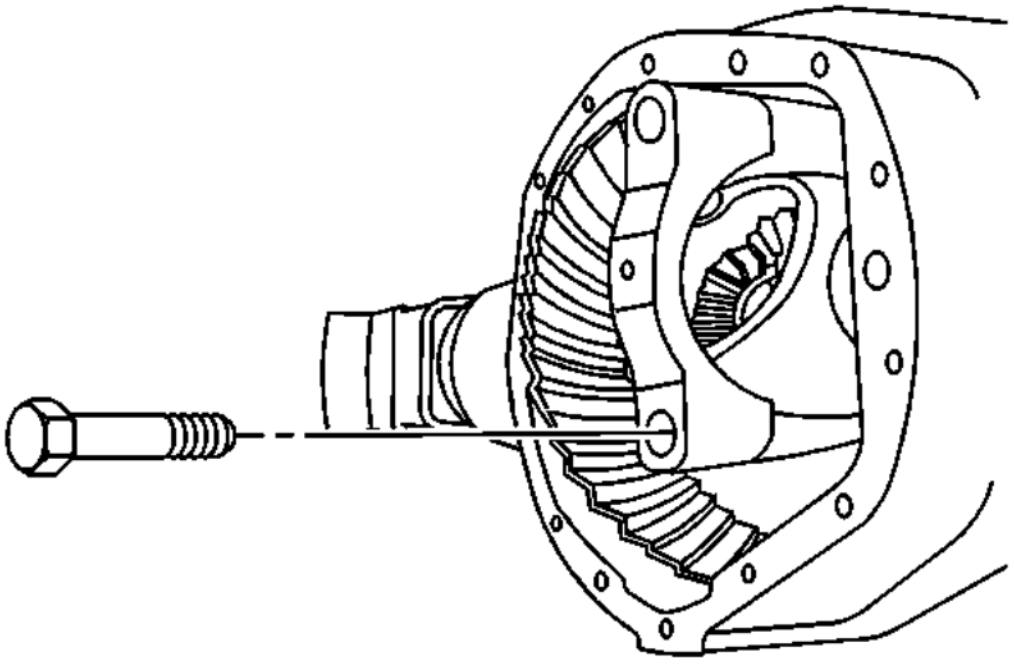


Fig. 180: Removing/Installing Bearing Cap Bolt
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Differential Case Removal Caution .

4. Remove the bearing cap bolts.
5. Remove the bearing caps. Mark the bearing caps left and right.

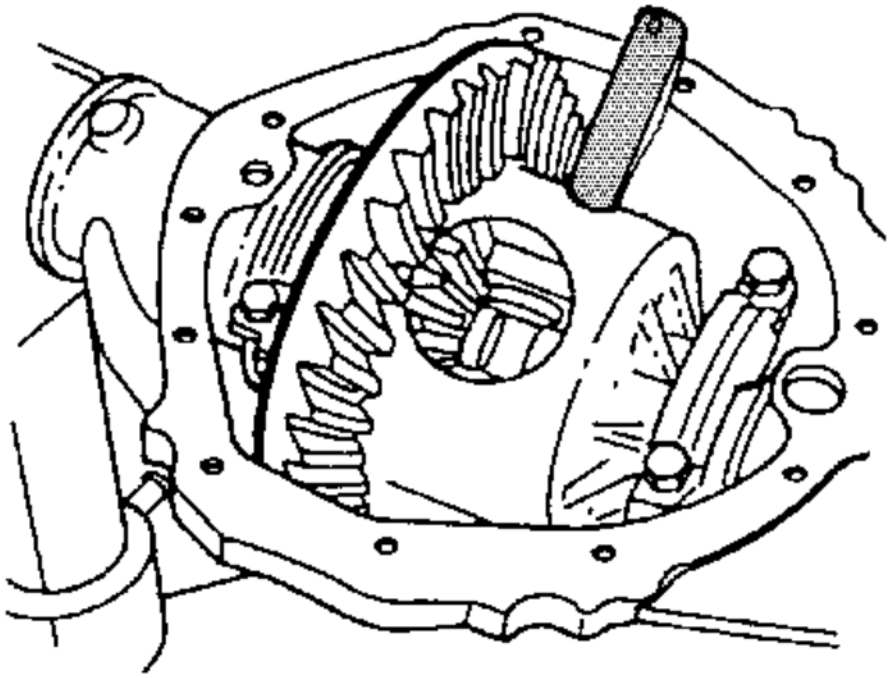


Fig. 181: Pinion Shaft Touching Housing
Courtesy of GENERAL MOTORS CORP.

6. For the 8.6 inch axle, install the pinion shaft into the differential case part way and rotate the differential assembly until the pinion shaft contact the top of the axle housing.

NOTE: **Refer to Differential Housing Cover and Gasket Removal Notice .**

7. For the 8.6 inch axle, rotate the drive pinion clockwise in order to force the differential assembly out of the axle housing.
8. For the 9.5/9.5LD inch axle, loosen the differential bearing adjuster nut using the **J 24429** . See **Special Tools**.
9. Remove the differential assembly.
10. Remove the bearing cups, the shims, and the spacers as necessary.

Mark the cups and shims left and right and in the proper order as necessary. Place the cups and the shims with the bearing caps.

11. Remove the differential side bearings, if necessary. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)**.
12. Remove the ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

Installation Procedure

1. Install the ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
2. Install the differential side bearings, if necessary. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)**.
3. Lubricate the differential side bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

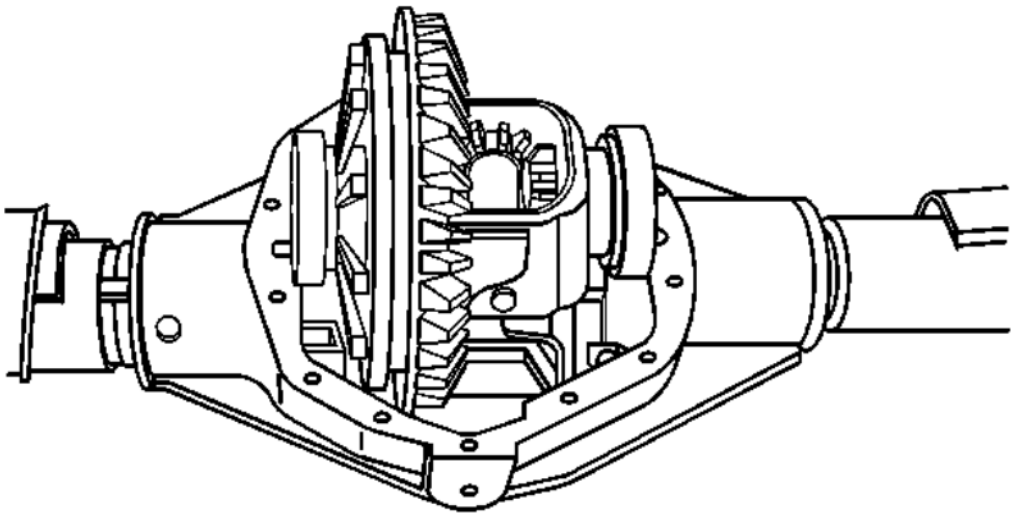


Fig. 182: View Of Differential Case And Axle Housing
Courtesy of GENERAL MOTORS CORP.

4. Place the case, with the bearing cups installed, into the axle housing.

   Support the case in order to keep the case from falling out of the axle housing.

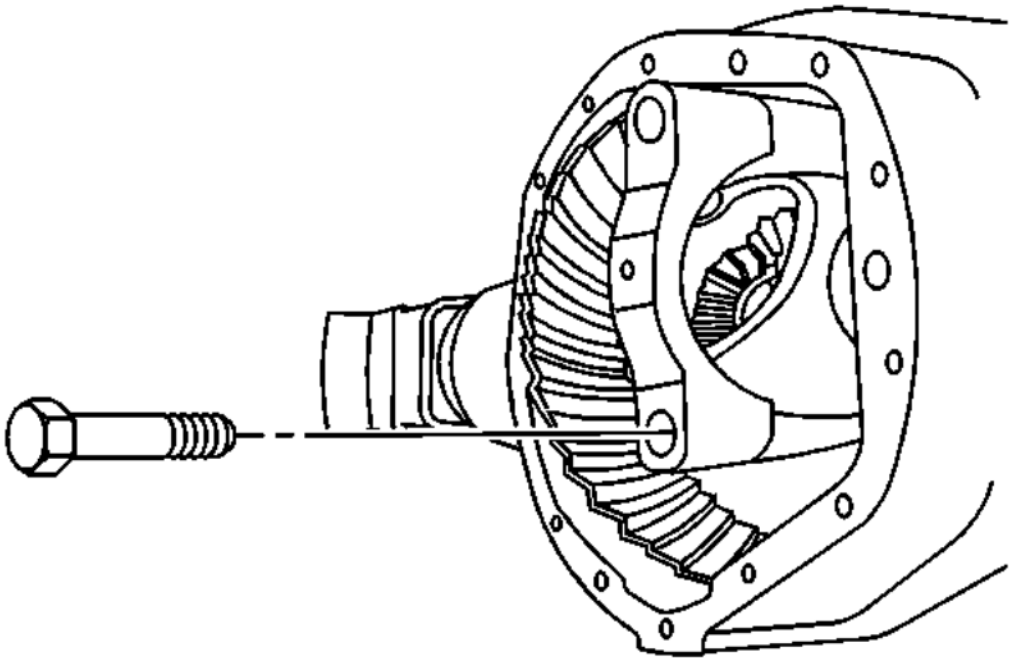


Fig. 183: Removing/Installing Bearing Cap Bolt
Courtesy of GENERAL MOTORS CORP.

5. Install the bearing caps and the bolts. Do not torque the bearing cap bolts at this time.
6. Adjust the differential side bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (10.5 Inch, 11.5 Inch Axles)** or **Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Carrier Bearing Preload Adjustment (9.5, and 9.5LD Inch Axles)**.
7. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
8. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.

NOTE: Refer to Fastener Notice .

9. Tighten the bearing cap bolts.

   Tighten:

   - For the 8.6 inch axle, tighten the bearing cap bolts to 75 N.m (55 lb ft)
   - For the 9.5/9.5LD inch axle, tighten the bearing cap bolts to 85 N.m (63 lb ft)

10. Install the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)**.
11. Fill the axle with the proper lubricant. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
12. Lower the vehicle.

DIFFERENTIAL REPLACEMENT (10.5 INCH, 11.5 INCH AXLE)

Tools Required

J 24429 Side Bearing Backlash Spanner. See **Special Tools**.

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the axle shafts. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
3. Remove the rear axle housing cover and the gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.

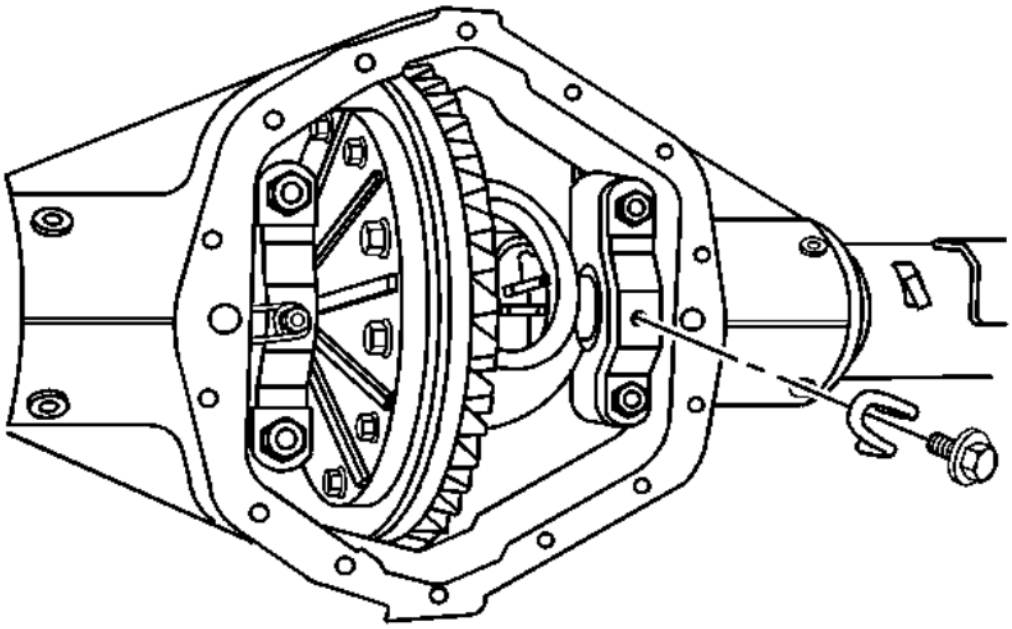


Fig. 184: Differential Bearing Adjuster Nut Lock
Courtesy of GENERAL MOTORS CORP.

4. Remove the differential bearing adjuster nut retainers.

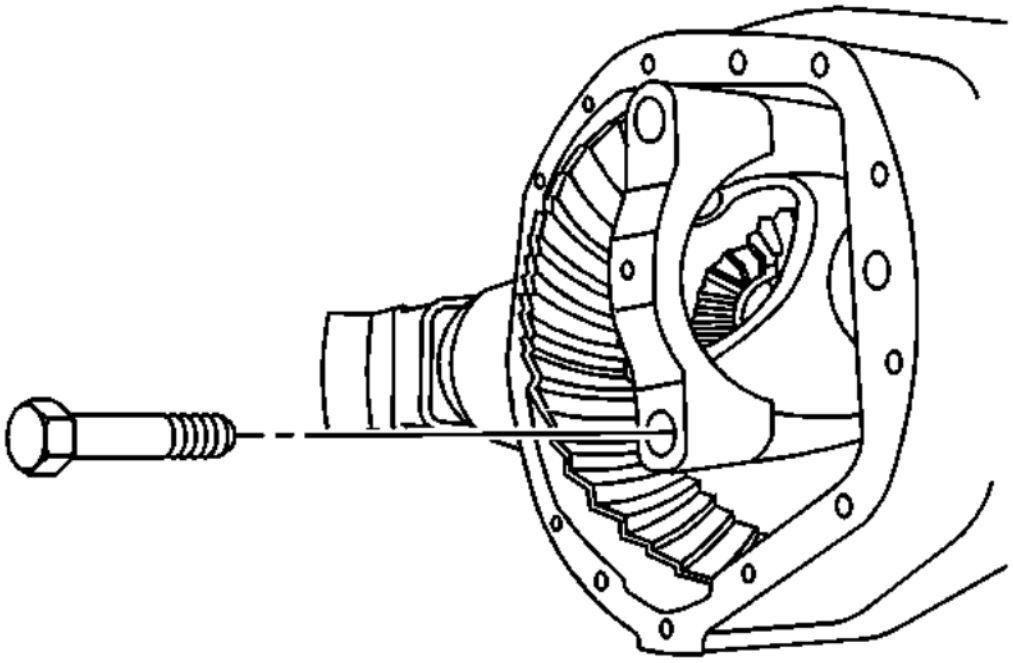


Fig. 185: Removing/Installing Bearing Cap Bolt
Courtesy of GENERAL MOTORS CORP.

5. Remove the bearing caps and bolts. Mark the bearing caps left and right.

CAUTION: To prevent personal injury and/or component damage, support the differential case when removing the case from the axle housing. If the case is not supported, the differential case could fall and cause personal injury or damage to the differential case.

NOTE: When removing the differential case from the axle housing, do not damage the cover gasket surface. If the cover gasket surface is damaged, lubricant may leak from the axle and cause premature failure of the axle assembly.

6. Loosen the adjusters using the **J 24429** . See **Special Tools**.

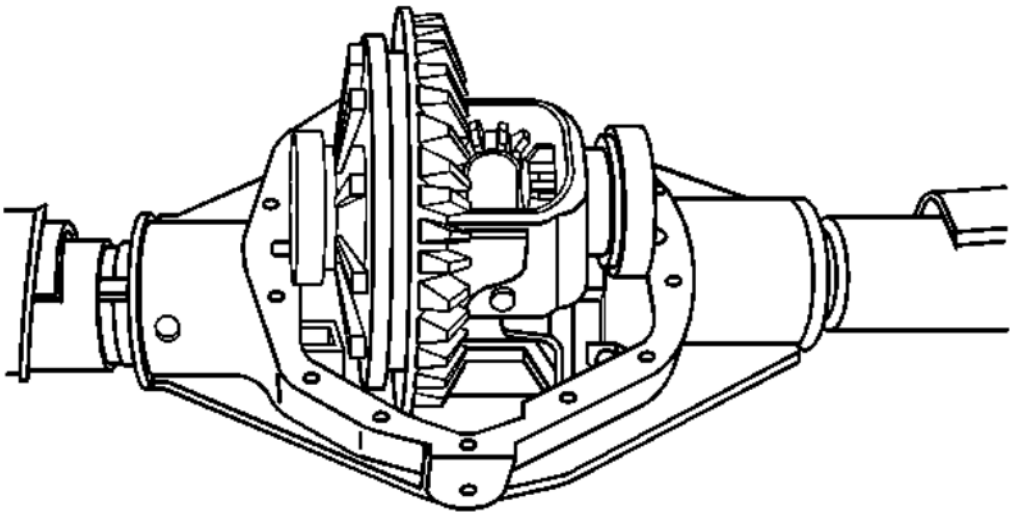


Fig. 186: View Of Differential Case And Axle Housing
Courtesy of GENERAL MOTORS CORP.

7. Remove the differential.
8. Remove the bearing cups.

   Mark the cups left and right. Place the cups with the bearing caps.

9. Remove the differential side bearings, if necessary. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)**.
10. Remove the ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

Installation Procedure

1. Install the ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
2. Install the differential side bearings, if necessary. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)**.
3. Lubricate the differential side bearings with axle lubricant. Use the proper fluid. Refer to

Fluid and Lubricant Recommendations .

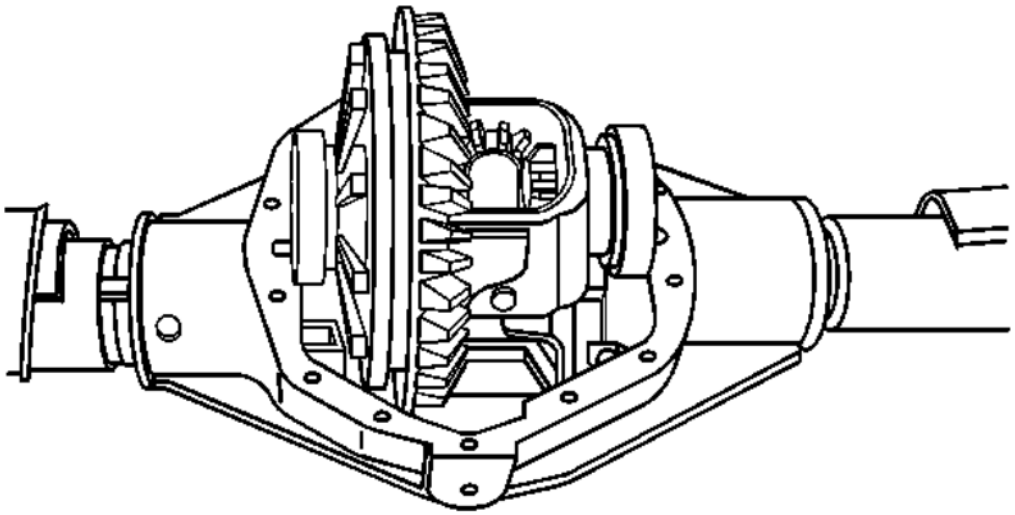


Fig. 187: View Of Differential Case And Axle Housing
Courtesy of GENERAL MOTORS CORP.

4. Place the case, with the bearing cups installed, into the axle housing.

   Support the case in order to keep the case from falling out of the axle housing.

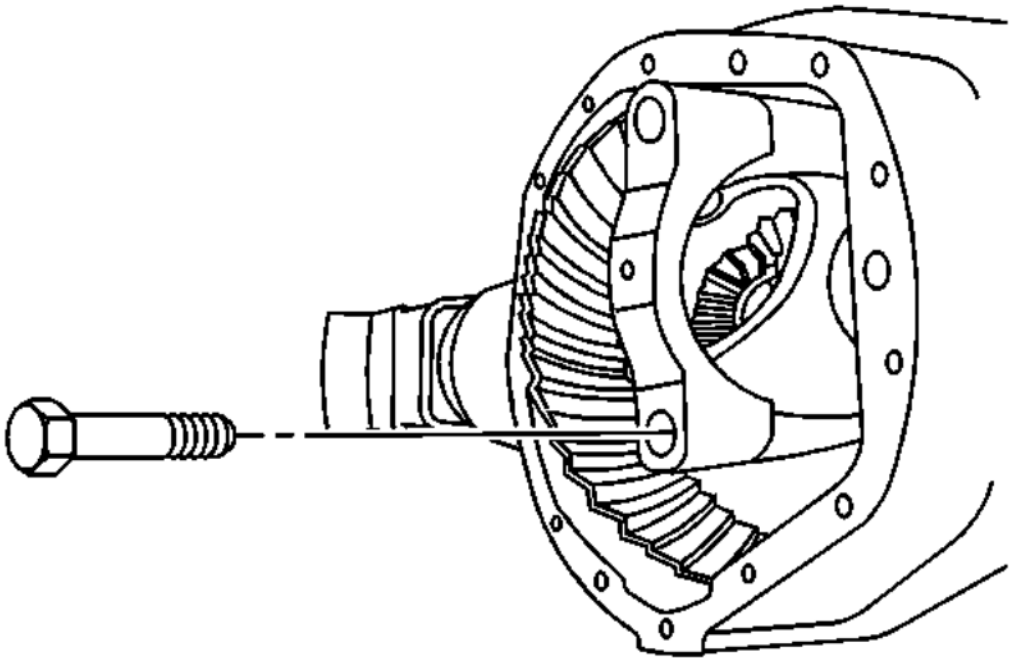


Fig. 188: Removing/Installing Bearing Cap Bolt
Courtesy of GENERAL MOTORS CORP.

5. Install the bearing caps and the bolts.

   Do not torque the bearing cap bolts at this time.

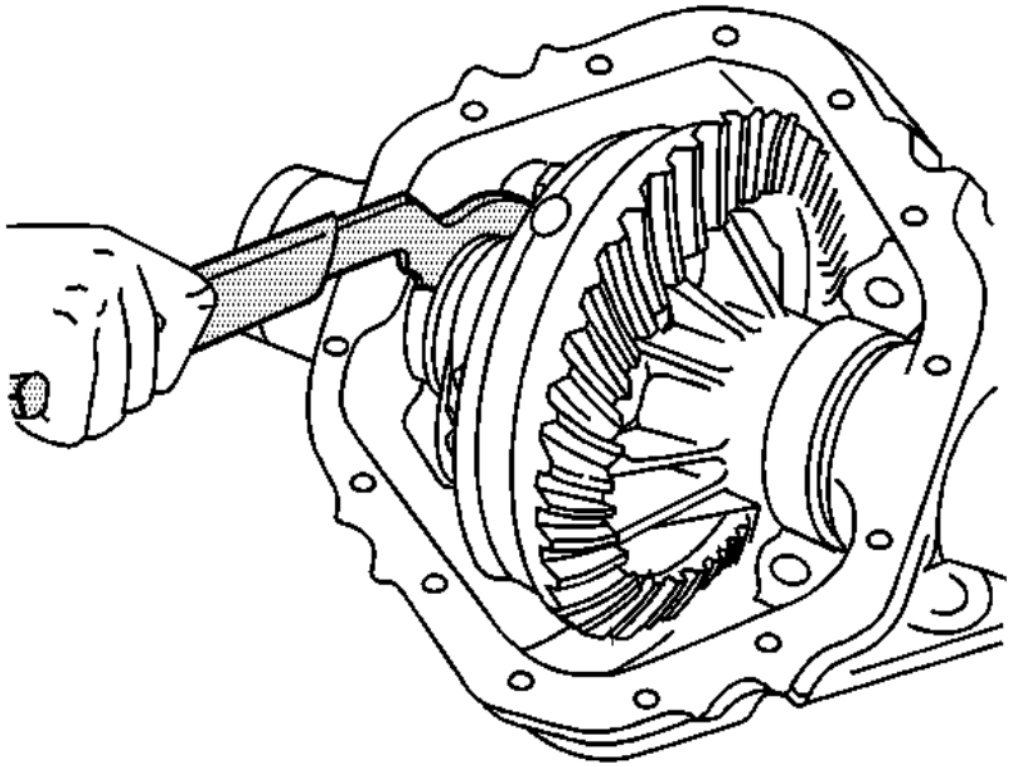


Fig. 189: Turning Adjusters Using J 24429
Courtesy of GENERAL MOTORS CORP.

6. Turn the adjusters evenly on each side using the **J 24429** until snug against the differential. See **Special Tools**.
7. Adjust the differential side bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (10.5 Inch, 11.5 Inch Axles)** or **Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Carrier Bearing Preload Adjustment (9.5, and 9.5LD Inch Axles)**.
8. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
9. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.

NOTE: Refer to Fastener Notice .

10. Tighten the bearing cap bolts.

    Tighten:
    - Tighten the bearing cap bolts to 185 N.m (136 lb ft) (10.5 inch axle).
    - Tighten the bearing cap bolts to 207 N.m (153 lb ft) (11.5 inch axle).

11. Install the axle shafts and new gaskets. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
12. Install the rear axle housing cover and a new gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
13. Fill the axle with lubricant. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .
14. Lower the vehicle.

DIFFERENTIAL SIDE BEARINGS REPLACEMENT (ALL EXCEPT 9.75 INCH AXLE)

Tools Required

- **J 22912-B** Split Plate Bearing Puller
- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 21784** Side Bearing Installer. See **Special Tools**.
- **J 22888-D** Side Bearing Remover Kit
- **J 29710** Differential Side Bearing Installer
- **J 36597** Side Bearing Puller Pilot - 9.25 Axle
- **J 44420** Differential Bearing and Hub Seal Installer. See **Special Tools**.

Removal Procedure

1. Remove the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.

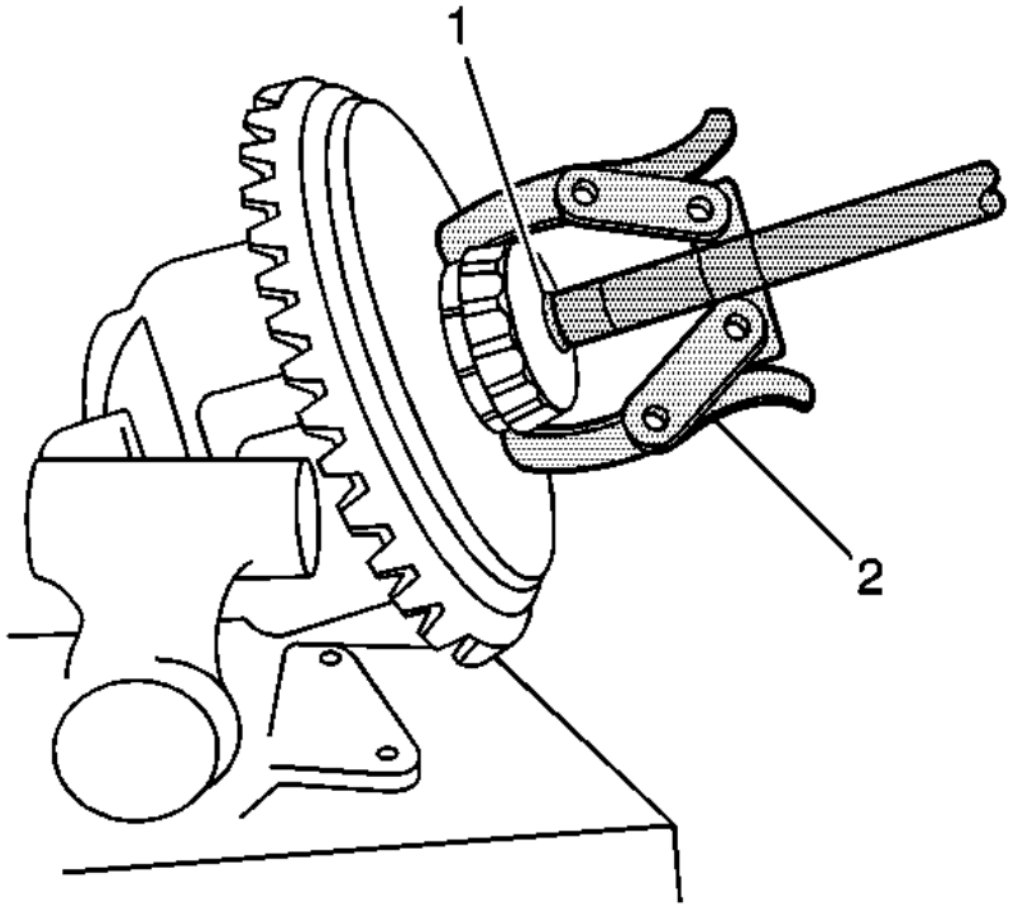


Fig. 190: Removing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

2. Remove the differential side bearings by doing the following:
    1. For the 8.6 inch, 9.5 inch, 11.5 inch axles, install the differential assembly into a vise.
    2. For the 10.5 inch axle, place a block of wood on each side of the differential assembly.

       Install the differential assembly into a vise.

    3. Install the **J 22888-20A** (2) and the **J 8107-4** , 8. See **Special Tools**.6 inch axle, or the **J 36597** , 9.5 inch or 10.5 inch axle, or the J 8107-5, 11.5 inch (1) axle, over the differential case side bearing bore.

4. Remove the differential side bearings using the **J 22888-20A** . See **Special Tools**.

Installation Procedure

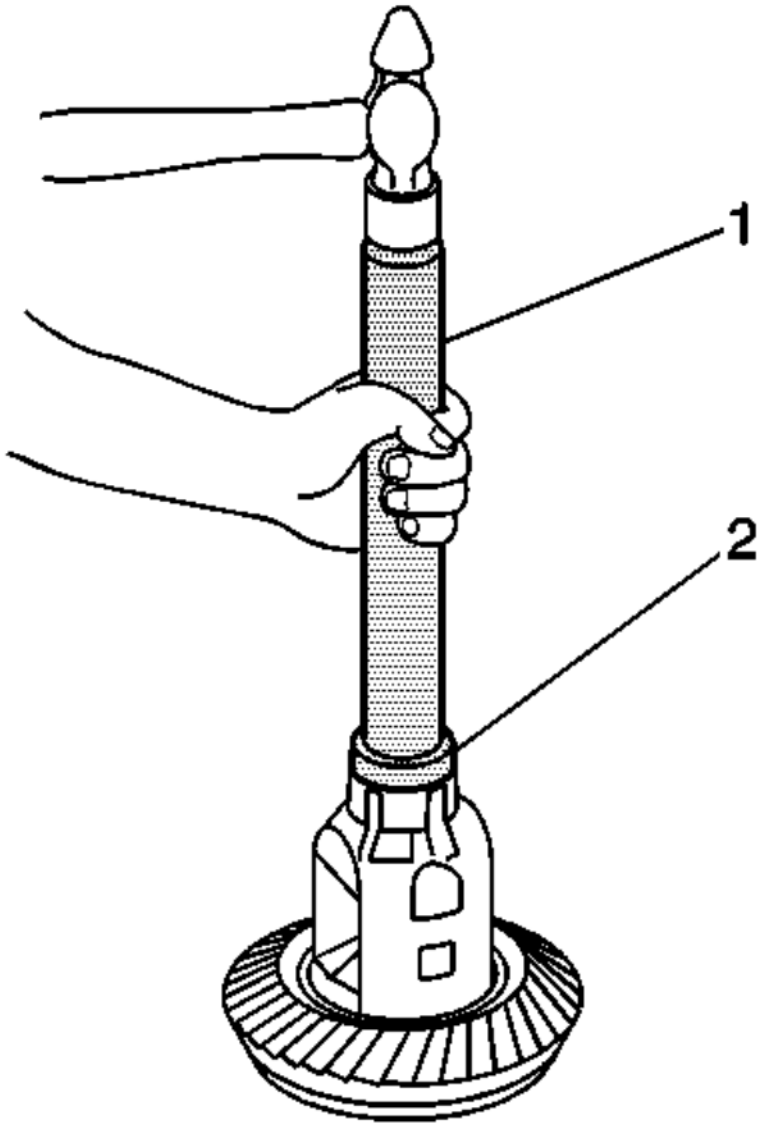


Fig. 191: Driving Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS CORP.

1. For the 8.6 inch, the 9.5 inch, and the 10.5 inch axles, install the differential side bearings by doing the following:
    1. In order to protect the differential case, install the**J 8107-4** , 8. See **Special Tools**.6 inch axle, or the **J 36597** , 9.5 inch or 10.5 inch axles, in the case on the side opposite the bearing installation.
    2. Install the **J 21784** , 8. See **Special Tools**.6 inch axle, or the **J 29710** , 9.5 inch or 10.5 inch axles (2), and the **J 8092** (1) onto the differential case bearing as shown.
    3. Drive the bearing onto the case using the **J 21784** or the **J 29710** and the **J 8092** . See **Special Tools**.

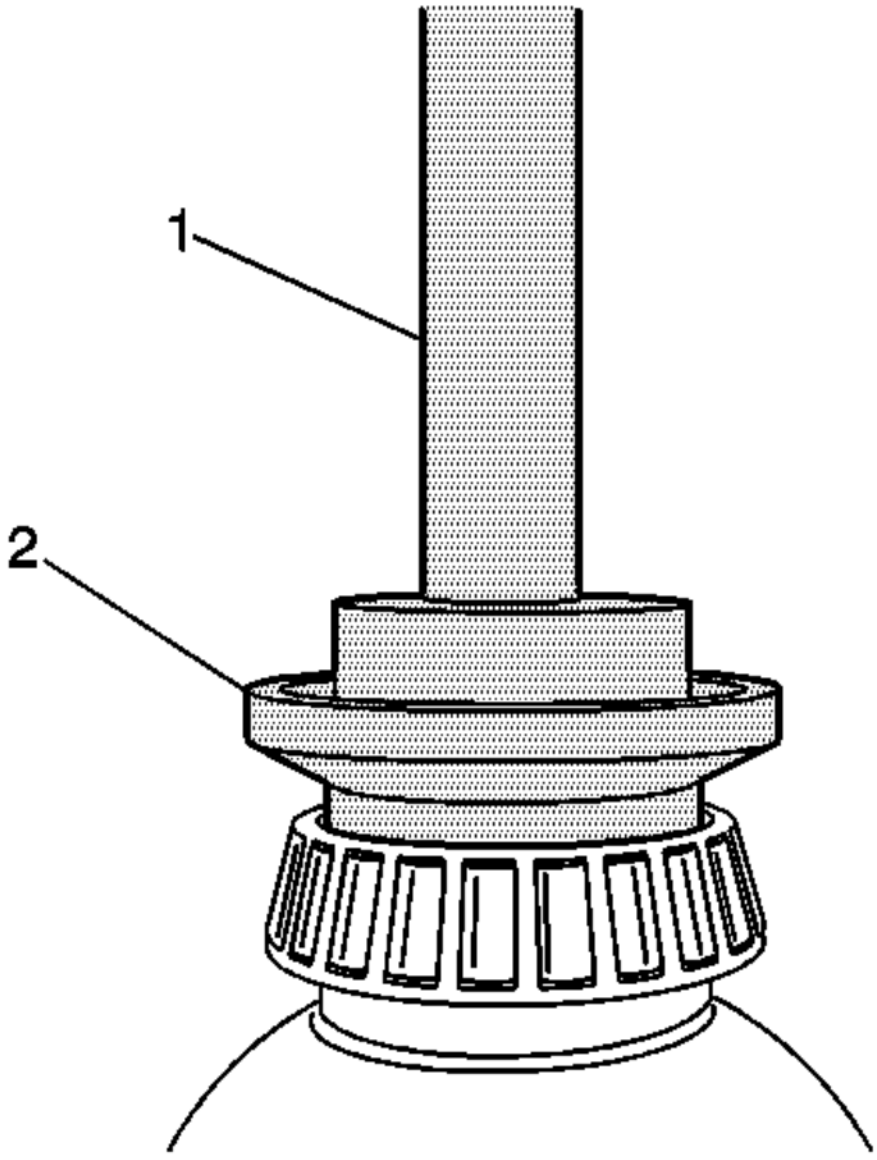


Fig. 192: Installing Differential Side Bearings (11.5 Inch Axles)
Courtesy of GENERAL MOTORS CORP.

2. For the 11.5 inch axle, install the differential side bearings by doing the following:
    1. In order to protect the differential case, install the J 8107-5 in the case on the side

opposite the bearing installation.

2. Install the **J 44420** (2) and the **J 8092** (1) onto the differential case bearing as shown. See **Special Tools**.
3. Drive the bearing onto the case using the **J 44420** and the **J 8092** . See **Special Tools**.

3. Install the differential assembly. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.

REAR AXLE REPLACEMENT (15 SERIES WITH DRUM BRAKES)

Removal Procedure

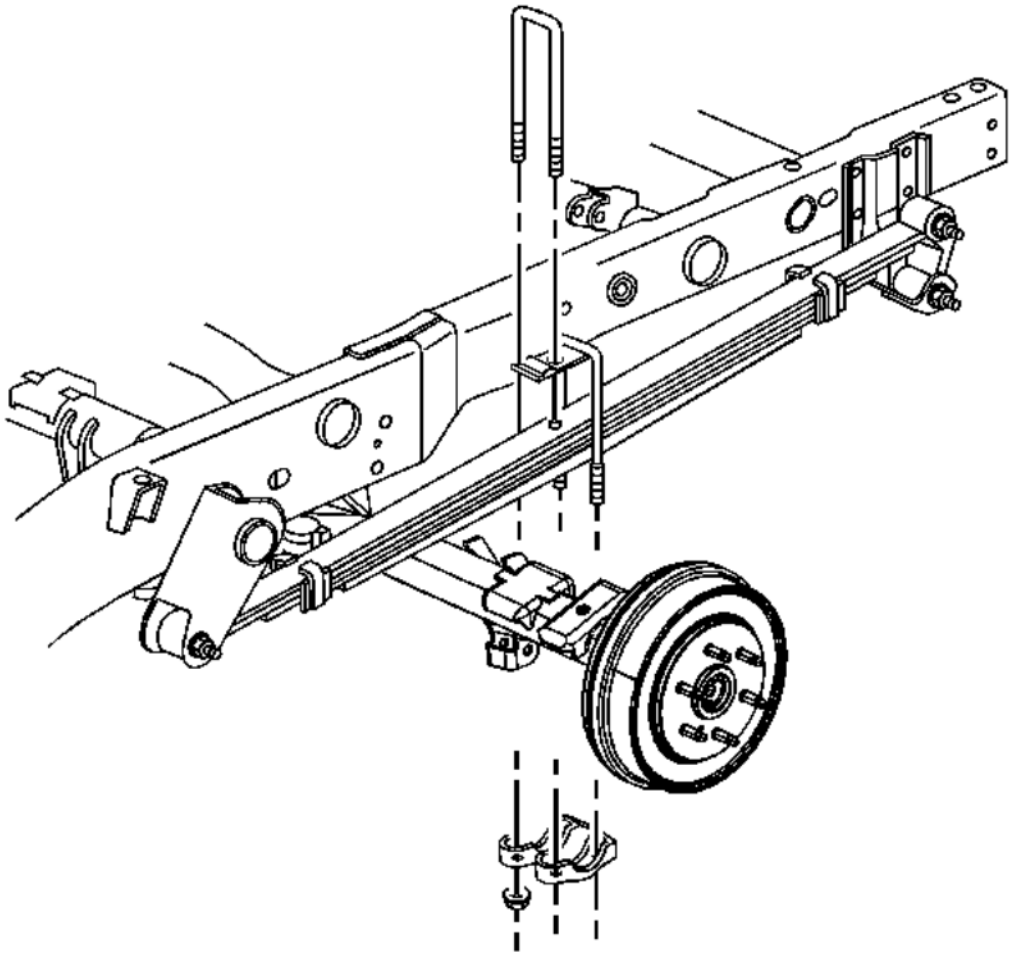


Fig. 193: View Of Rear Axle Assembly
Courtesy of GENERAL MOTORS CORP.

1. Raise support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Place jack or utility stands (such as GMDE 123-B67313) at the front end of the vehicle.
3. Drain the axle lubricant from the rear axle. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
4. Disconnect the propeller shaft. Refer to **One-Piece Propeller Shaft Replacement** .
5. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
6. Disconnect the parking brake cable. Refer to **Parking Brake Rear Cable Replacement - Left Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Left Side (JD9)** and **Parking Brake Rear Cable Replacement - Right Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Right Side (JD9)** .
7. Remove the brake line bracket bolts. Suspend the brake lines from the vehicle with heavy mechanics wire.
8. Disconnect the shock absorbers from the axle brackets. Refer to **Shock Absorber Replacement (1500)** or **Shock Absorber Replacement (2500, 3500)** .
9. Remove the vent hose from the rear axle vent fitting. Refer to **Vent Hose Replacement**.
10. Remove the nuts and the washers from the U-bolts.
11. Remove the U-bolts, the spring plates and the spacers from the axle assembly.
12. Lower the axle assembly.

Installation Procedure

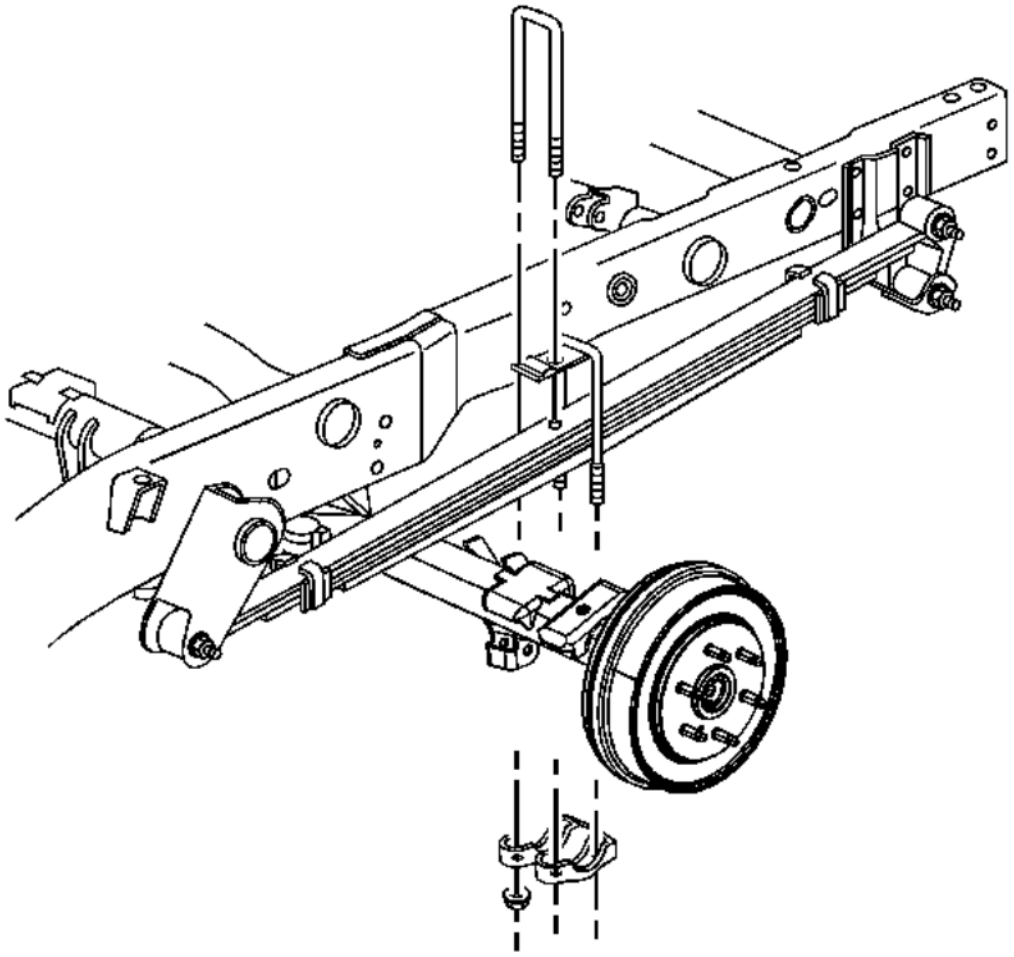


Fig. 194: View Of Rear Axle Assembly
Courtesy of GENERAL MOTORS CORP.

1. Place the rear axle assembly under the vehicle.
2. Align the rear axle assembly with the springs.
3. Connect the spacers, the spring plates and the U-bolts to the rear axle.
4. Raise the rear axle assembly into position.

NOTE: Refer to Fastener Notice .

5. Install the washers if equipped and the nuts to the U-bolts.

Tighten: The nuts in a criss cross pattern to 72 N.m (53 lb ft).

6. Install the vent hose to the rear axle vent fitting. Refer to **Vent Hose Replacement**.
7. Connect the shock absorbers to the rear axle. Refer to **Shock Absorber Replacement (1500)** or **Shock Absorber Replacement (2500, 3500)** .
8. Install the brake lines and the brake line bracket bolts to the axle.
9. Connect the parking brake cable. Refer to **Parking Brake Rear Cable Replacement - Left Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Left Side (JD9)** and **Parking Brake Rear Cable Replacement - Right Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Right Side (JD9)** .
10. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
11. Connect the propeller shaft. Refer to **One-Piece Propeller Shaft Replacement** .
12. Fill the axle with lubricant. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .
13. Remove the utility stands.
14. Lower the vehicle.

REAR AXLE REPLACEMENT (15/25 SERIES)

Removal Procedure

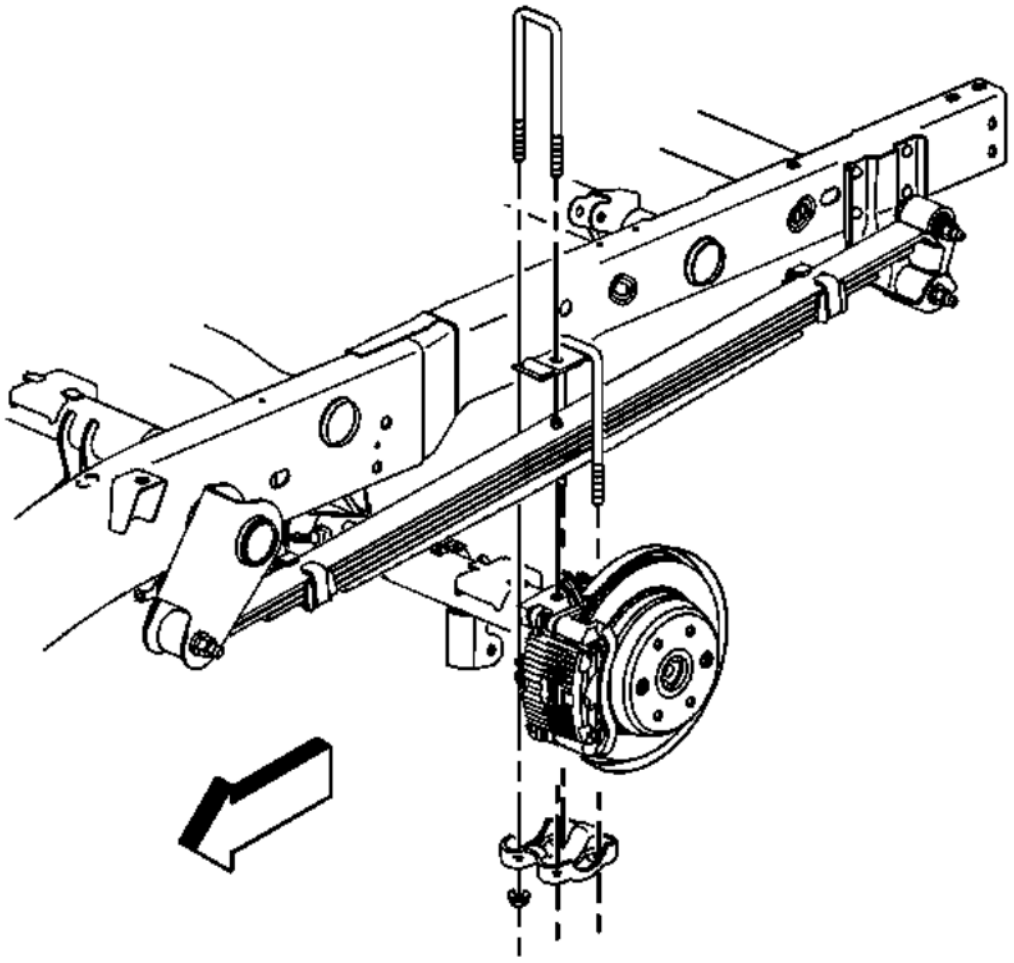


Fig. 195: Identifying U-Bolts
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Place jack or utility stands (such as GMDE 123-B67313) at the front end of the vehicle.
3. Drain the axle lubricant from the rear axle. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
4. Disconnect the propeller shaft. Refer to **One-Piece Propeller Shaft Replacement** or **Two-Piece Propeller Shaft Replacement** .

5. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
6. Disconnect the parking brake cable. Refer to **Parking Brake Rear Cable Replacement - Left Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Left Side (JD9)** and **Parking Brake Rear Cable Replacement - Right Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Right Side (JD9)** .
7. Remove the brake line bracket bolts. Suspend the brake lines from the vehicle with heavy mechanics wire.
8. Remove the brake calipers from the brake caliper mounting brackets. Do not disconnect the brake lines. Suspend the calipers from the vehicle with heavy mechanics wire. Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .
9. Disconnect the shock absorbers from the axle brackets. Refer to **Shock Absorber Replacement (1500)** or **Shock Absorber Replacement (2500, 3500)** .
10. Remove the vent hose from the rear axle vent fitting. Refer to **Vent Hose Replacement**.
11. Remove the nuts and the washers from the U-bolts.
12. Remove the U-bolts, the spring plates and the spacers form the axle assembly.
13. Lower the axle assembly.

Installation Procedure

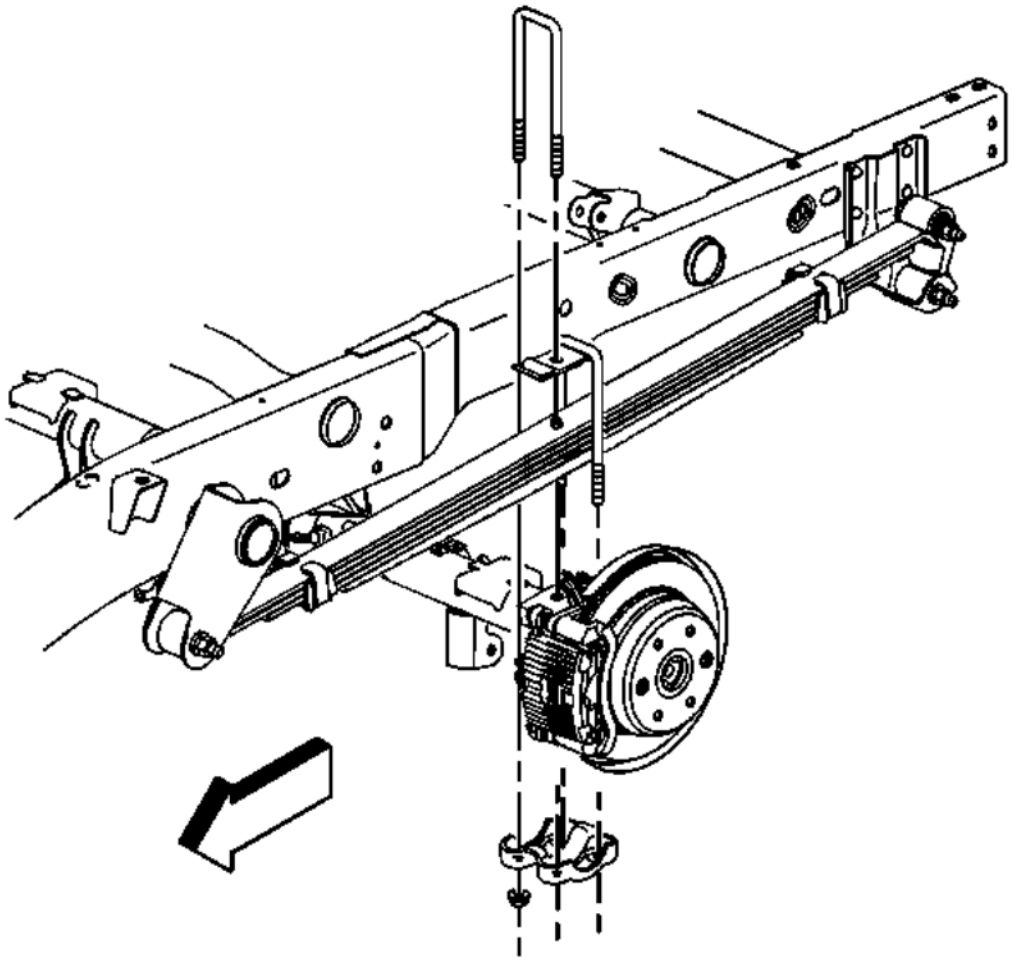


Fig. 196: Identifying U-Bolts
Courtesy of GENERAL MOTORS CORP.

1. Place the rear axle assembly under the vehicle.
2. Align the rear axle assembly with the springs.
3. Connect the spacers, the spring plates and the U-bolts to the rear axle.
4. Raise the rear axle assembly into position.

NOTE: Refer to Fastener Notice .

5. Install the washers if equipped and the nuts to the U-bolts.

Tighten:

- 15 Series tighten the nuts in a criss cross pattern to 72 N.m (53 lb ft).
- 25 series tighten the nuts in a criss cross pattern to 150 N.m (110 lb ft).

6. Install the vent hose to the rear axle vent fitting. Refer to **Vent Hose Replacement**.
7. Connect the shock absorbers to the rear axle. Refer to **Shock Absorber Replacement (1500)** or **Shock Absorber Replacement (2500, 3500)** .
8. Install the brake calipers. Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .
9. Install the brake lines and the brake line bracket bolts to the axle.
10. Connect the parking brake cable. Refer to **Parking Brake Rear Cable Replacement - Left Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Left Side (JD9)** and **Parking Brake Rear Cable Replacement - Right Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Right Side (JD9)** .
11. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
12. Connect the propeller shaft. Refer to **One-Piece Propeller Shaft Replacement** or **Two-Piece Propeller Shaft Replacement** .
13. Fill the axle with lubricant. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .
14. Remove the utility stands.
15. Lower the vehicle.

REAR AXLE REPLACEMENT (35 SERIES)

Removal Procedure

IMPORTANT: Observe and accurately reference mark all driveline components relative to the propeller shaft and axles before disassembly. These components include the propeller shafts, the drive axles, the pinion flanges, the output shafts, etc. All components must be reassembled in the exact relationship to each other as they were when removed. In addition, published specifications and torque values, as well as any measurements made prior to disassembly must be followed.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Place jack or utility stands (such as GMDE 123-B67313) at the front end of the vehicle.

3. Support the axle with jack stands.
4. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .

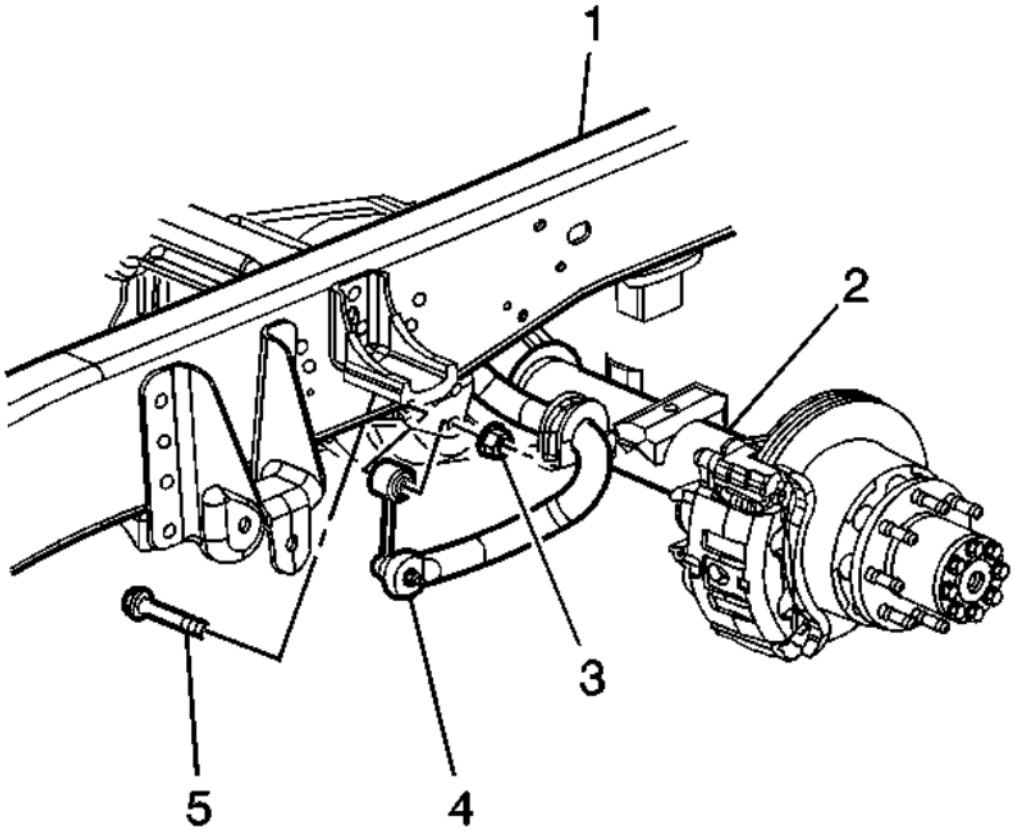


Fig. 197: Stabilizer Shaft Link, Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

5. Remove the stabilizer shaft link bolt (5) and the nut (3).
6. Disconnect the upper stabilizer shaft link (4) from the frame.

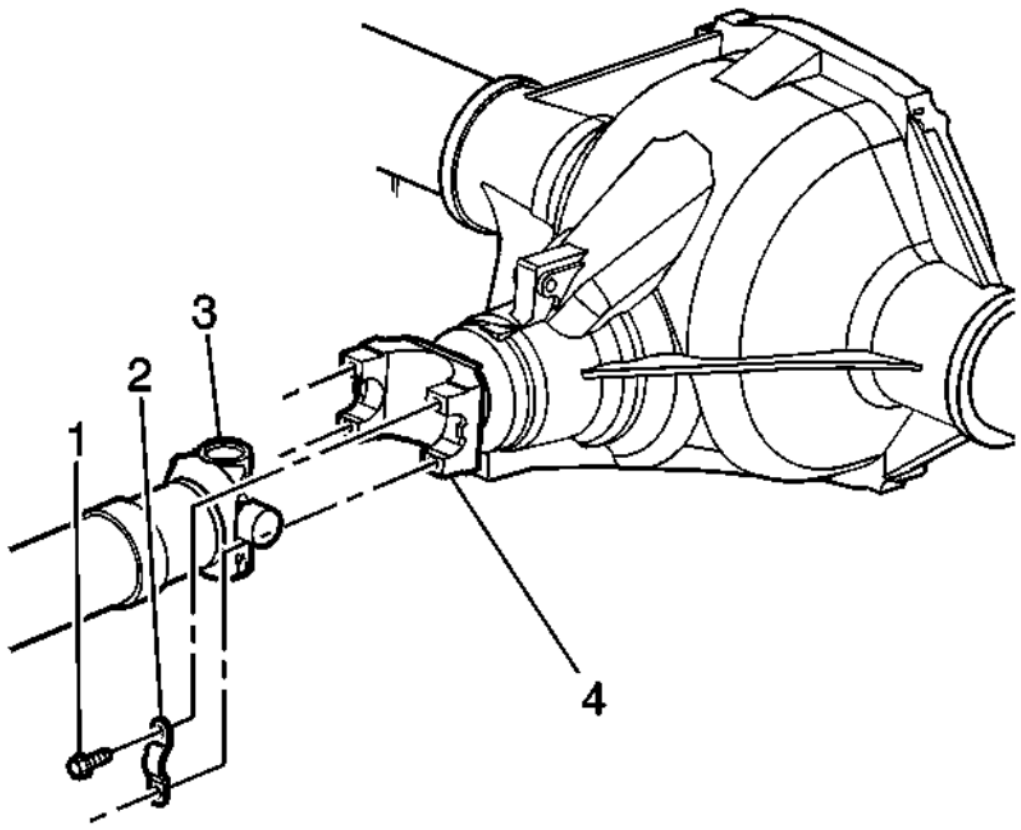


Fig. 198: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

7. Reference mark the rear propeller shaft (3) to the rear axle pinion yoke (4).
8. Disconnect the propeller shaft from the axle.

   Support the propeller shaft as necessary.

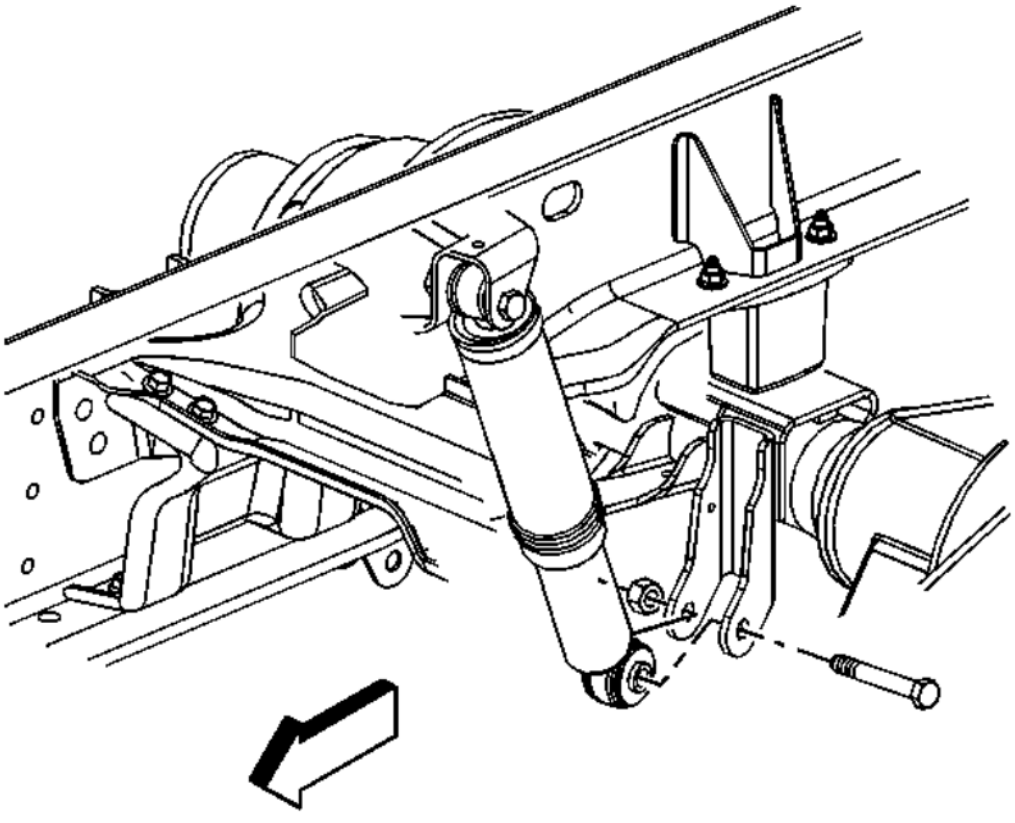


Fig. 199: Shock Absorber Lower Mount
Courtesy of GENERAL MOTORS CORP.

9. Disconnect the lower mount of the shock absorbers.

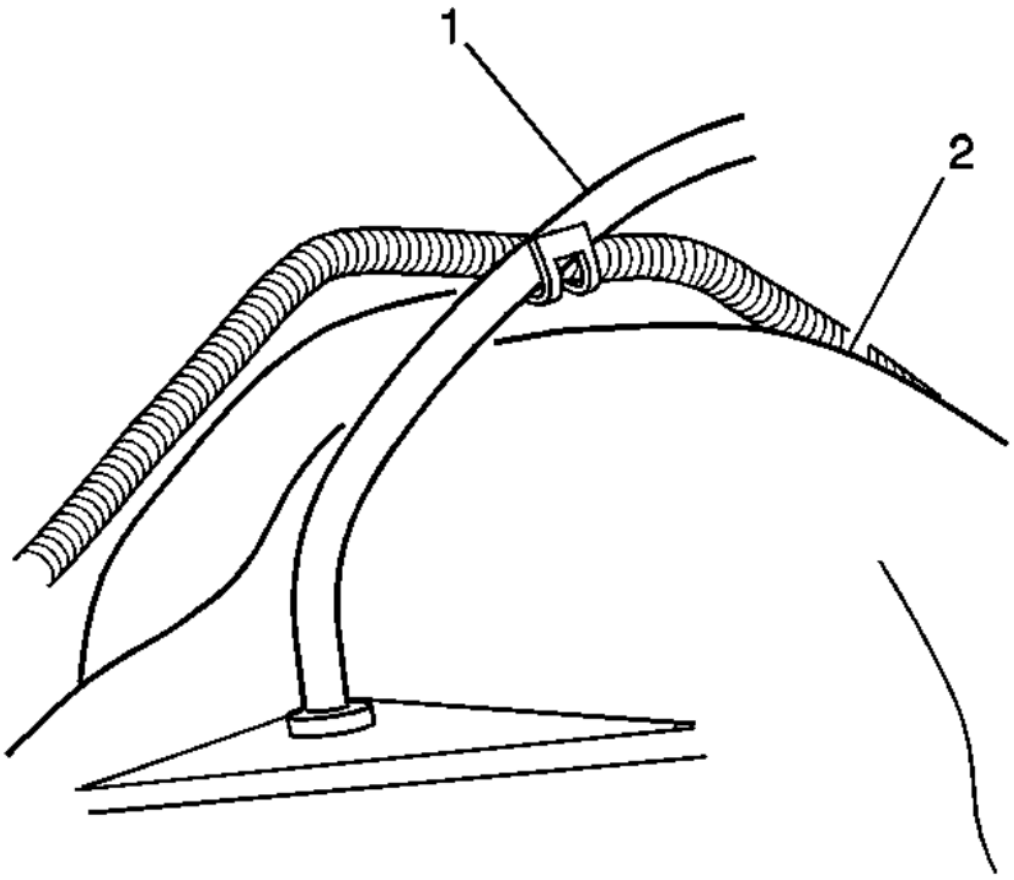
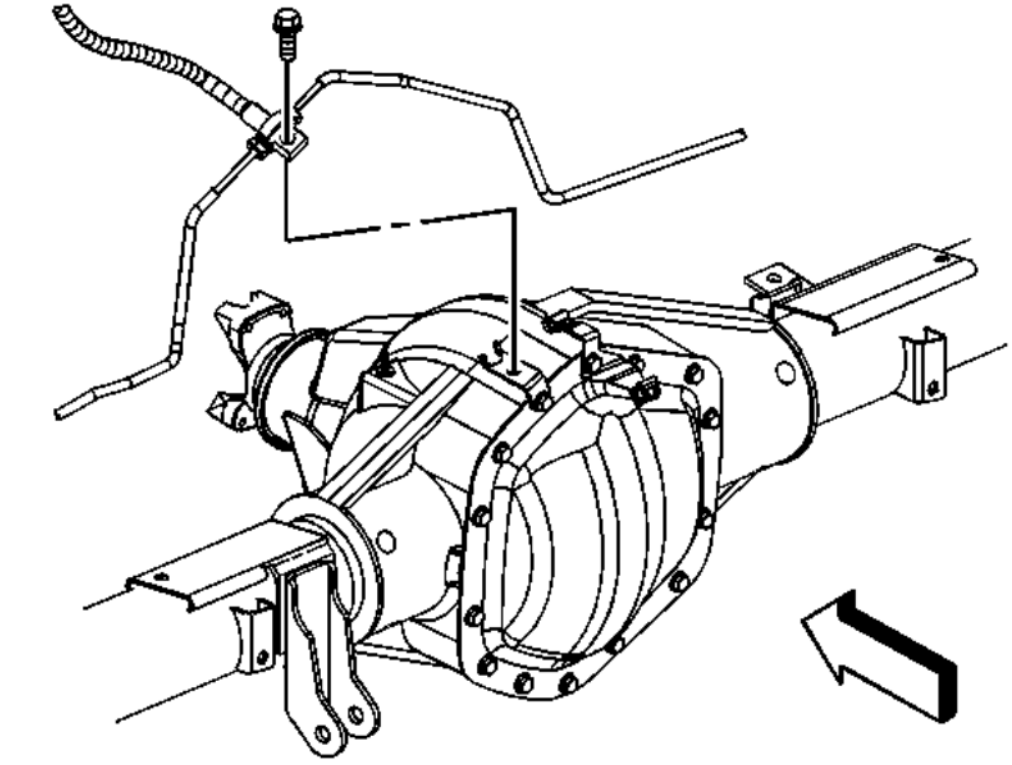


Fig. 200: Vent Hose & Rear Axle
Courtesy of GENERAL MOTORS CORP.

10. Disconnect the vent hose (1).
11. Disconnect the park brake cables. Refer to **Parking Brake Rear Cable Replacement - Left Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Left Side (JD9)** and **Parking Brake Rear Cable Replacement - Right Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Right Side (JD9)** .



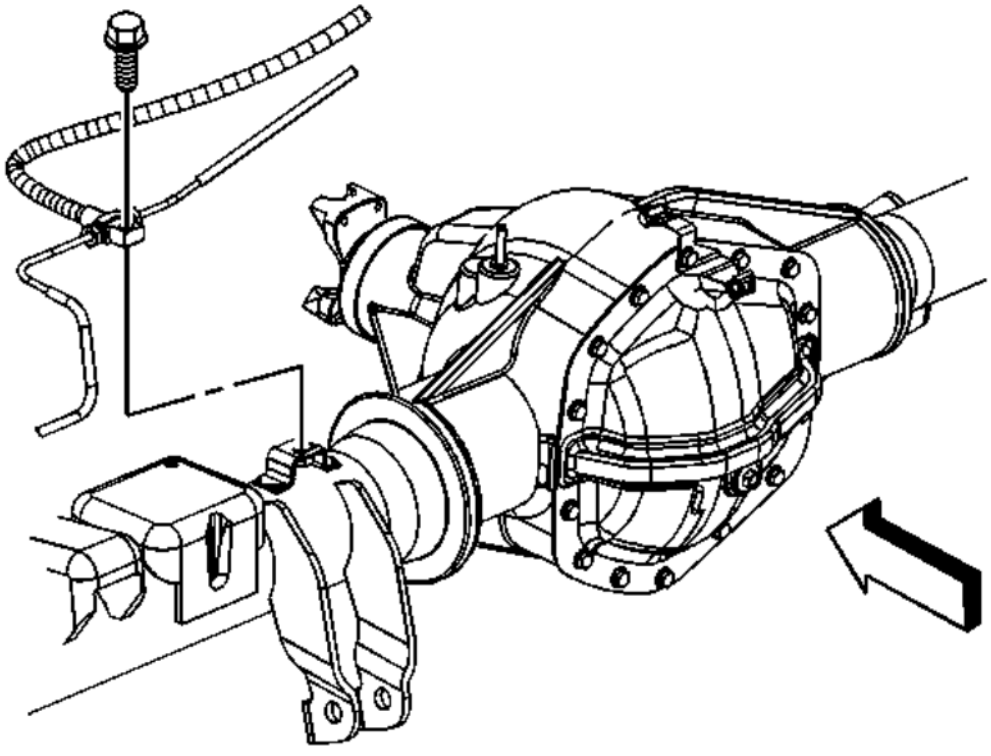


Fig. 201: View Of Junction Block
Courtesy of GENERAL MOTORS CORP.

12. Disconnect the junction block.

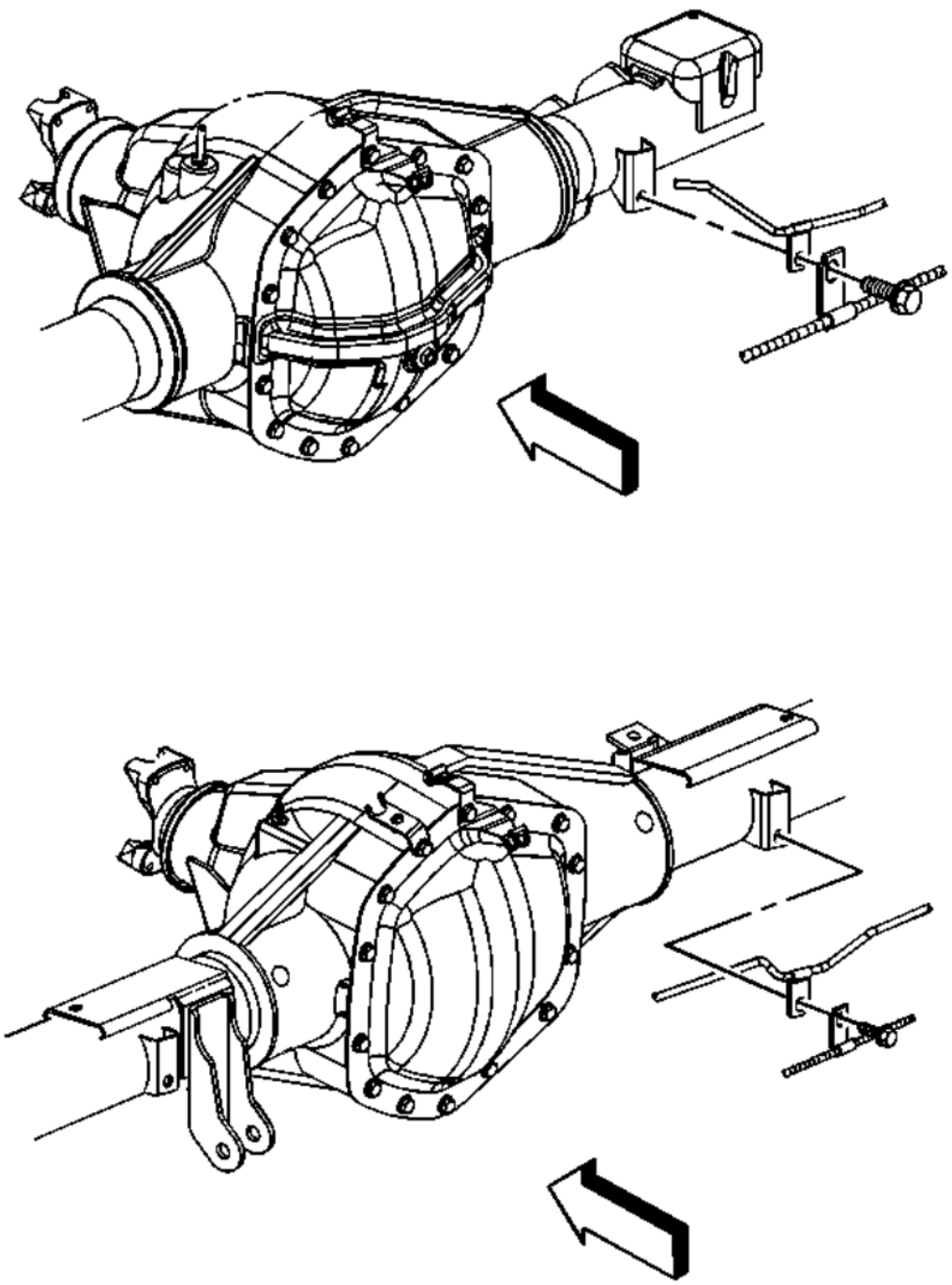


Fig. 202: View Of Brake Pipe
Courtesy of GENERAL MOTORS CORP.

13. Disconnect the brake pipe.

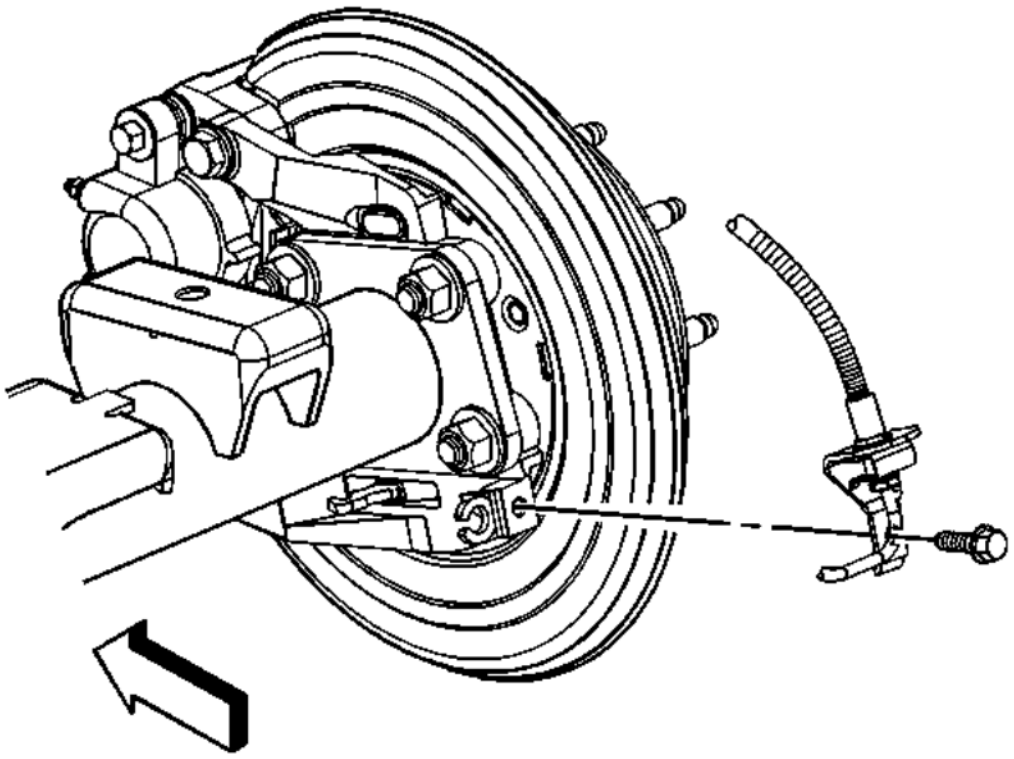


Fig. 203: View Of Brake Pipe Fitting Bracket At Brake Assembly
Courtesy of GENERAL MOTORS CORP.

14. Disconnect the brake pipe fitting bracket from the brake assembly.
15. Remove the brake calipers. Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .

NOTE: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid

leak.

16. Support the calipers from the frame using a heavy gage mechanics wire.

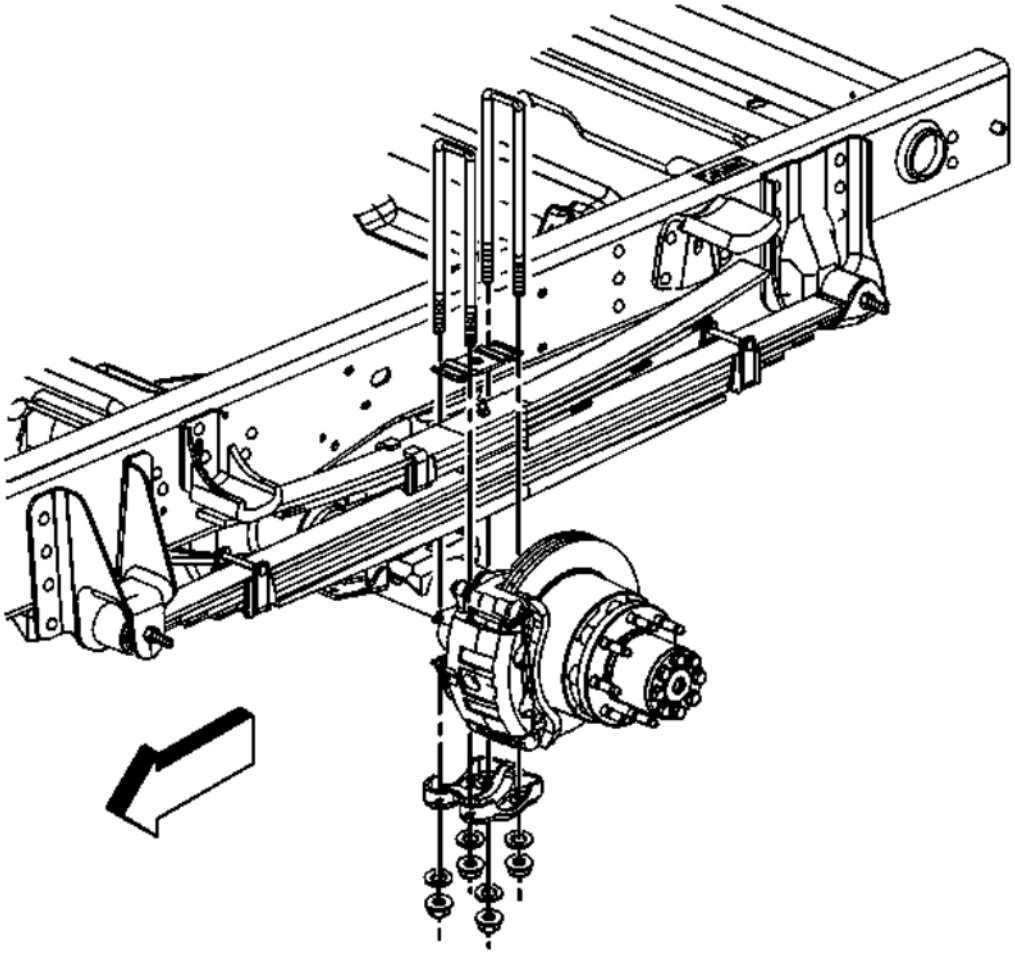


Fig. 204: View Of U-Bolts
Courtesy of GENERAL MOTORS CORP.

17. Remove the nuts and the washers from the spring assembly U-bolts.
18. Remove the U-bolts, the anchor plates and the spacers from the axle.
19. Remove the axle with the aid of a hydraulic assist.

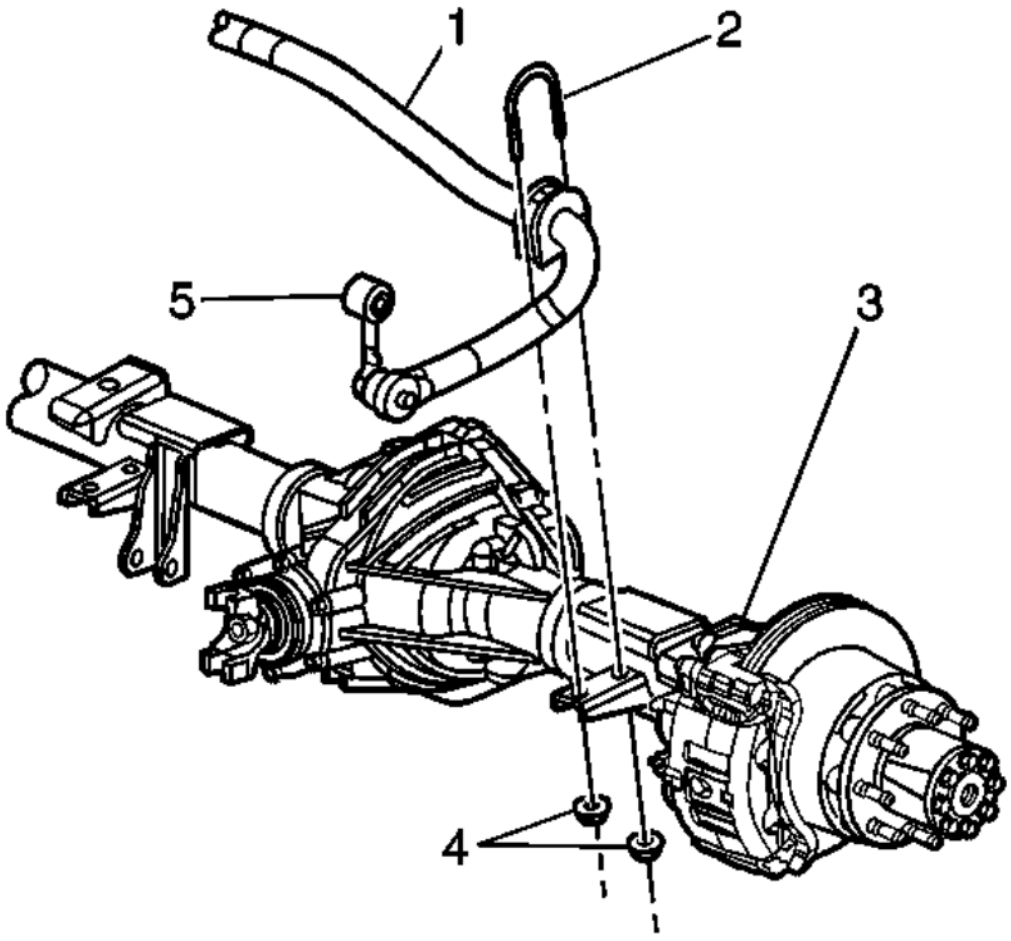


Fig. 205: Stabilizer Shaft, U-Bolts, Nuts & Axle
Courtesy of GENERAL MOTORS CORP.

20. Remove the stabilizer shaft U-bolt nuts (4) and the U-bolts (2) from the axle (3) (if necessary).
21. Remove the stabilizer shaft (1) from the axle (if necessary).

Installation Procedure

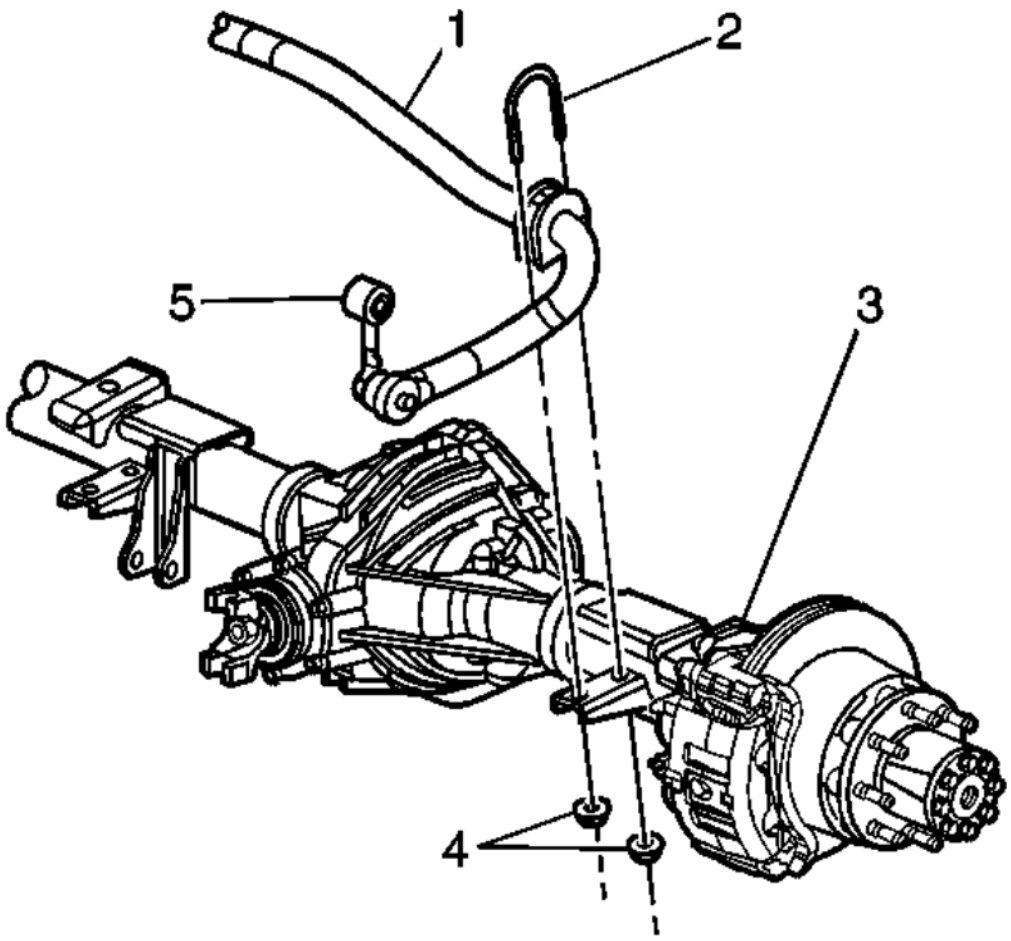


Fig. 206: Stabilizer Shaft, U-Bolts, Nuts & Axle
Courtesy of GENERAL MOTORS CORP.

1. Install the stabilizer shaft (1) to the axle (3) (if necessary).
2. Install the stabilizer shaft clamps, the U-bolts (2), and the nuts (4) (if necessary).

   Do not torque the stabilizer shaft U-bolt nuts at this time.

3. Place the axle under the vehicle.
4. Raise the axle to the springs with the aid of a hydraulic assist.

   Align the axle with the springs.

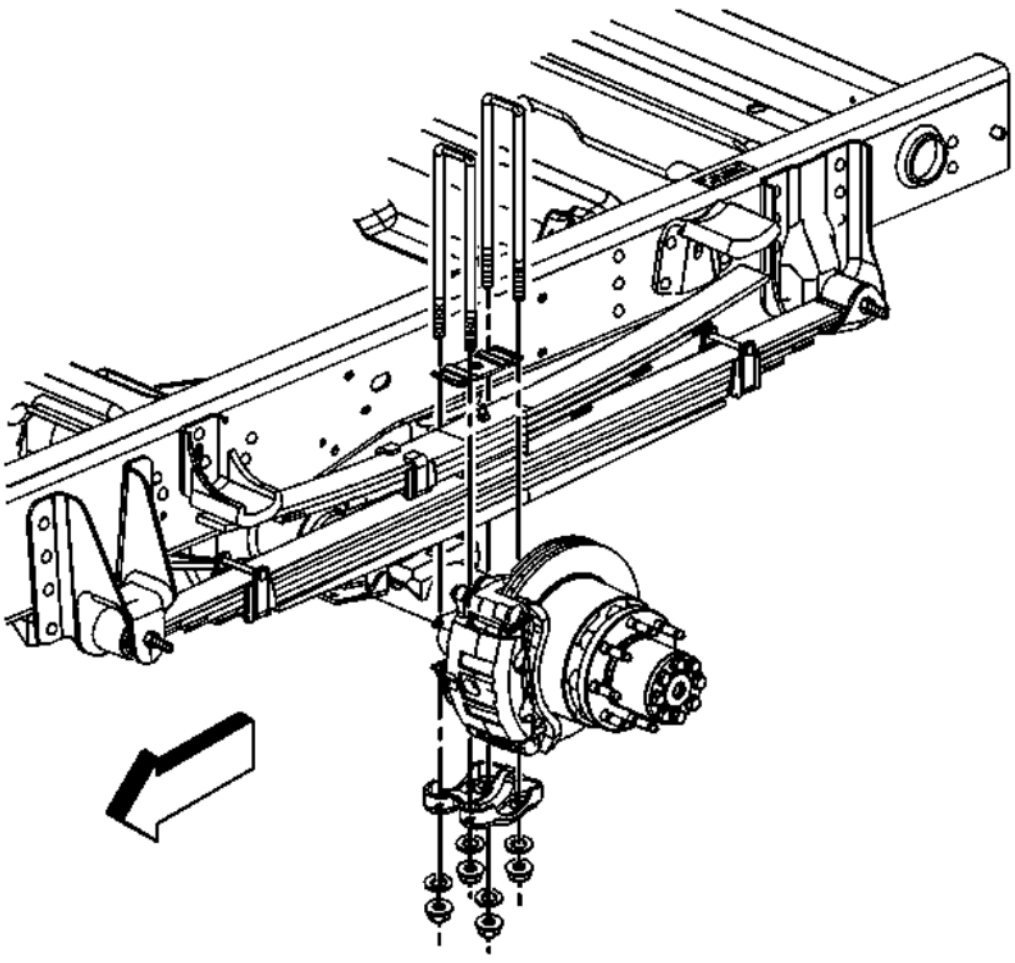


Fig. 207: View Of U-Bolts
Courtesy of GENERAL MOTORS CORP.

5. Install the spacers, the anchor plates and the U-bolts.

NOTE: **Refer to Fastener Notice .**

6. Install the washers if equipped and the nuts to the U-bolts.

Tighten: Tighten the nuts in a criss cross pattern to 150 N.m (110 lb ft).

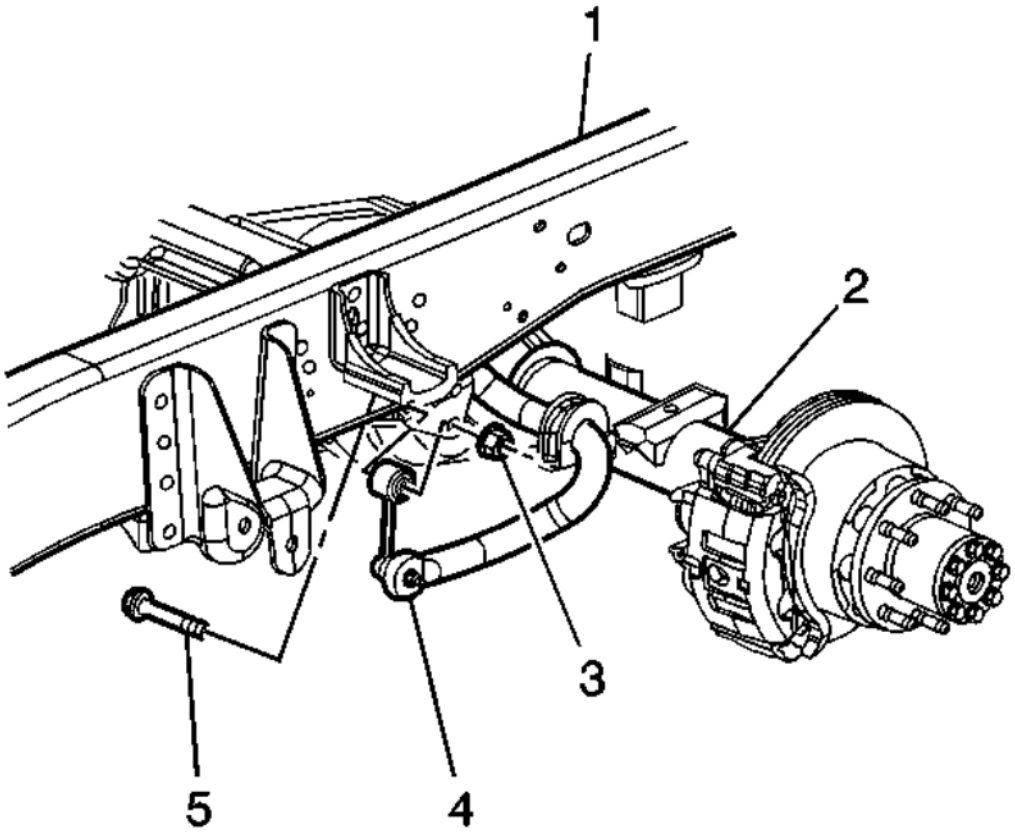


Fig. 208: Stabilizer Shaft Link, Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

7. Install the stabilizer shaft link to the frame (1) (if necessary).
8. Install the stabilizer shaft link bolt (5) and the nut (3) (if necessary).

Tighten:

1. Tighten the stabilizer shaft link bolts to 95 N.m (70 lb ft).
2. Tighten the stabilizer shaft U-bolt nuts to 32 N.m (24 lb ft).

9. Install the brake calipers. Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .

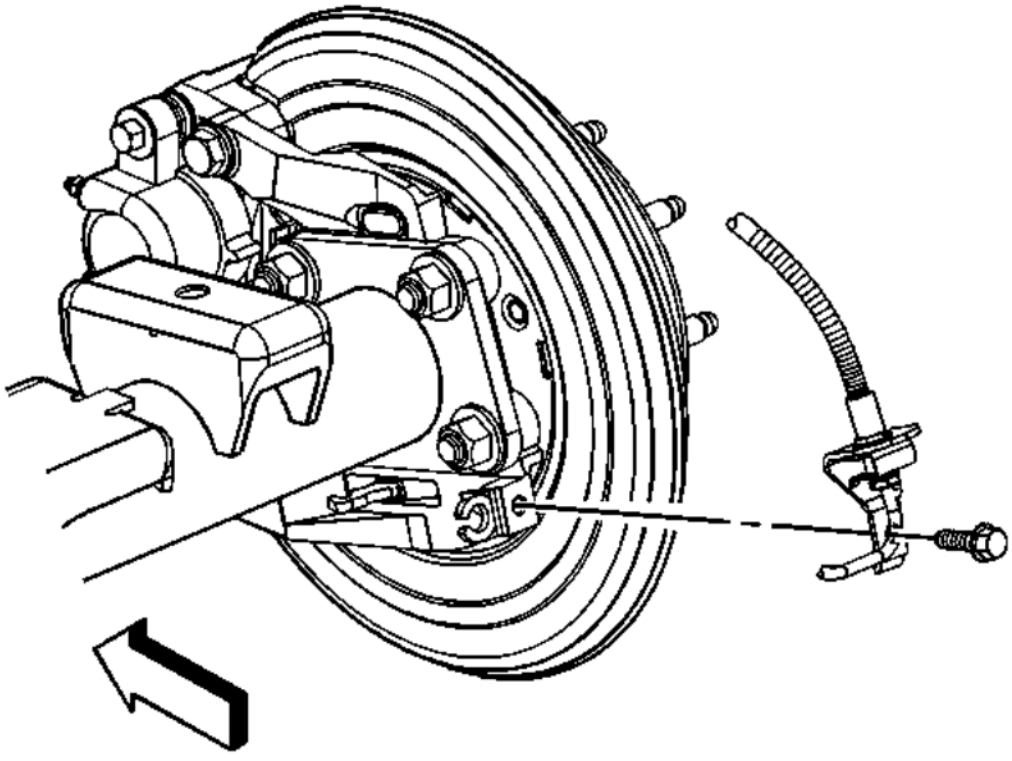


Fig. 209: View Of Brake Pipe Fitting Bracket At Brake Assembly
Courtesy of GENERAL MOTORS CORP.

10. Install the brake pipe fitting brackets.
11. Install the brake pipe fitting bracket bolts.

Tighten: Tighten the bolts to 22 N.m (16 lb ft).

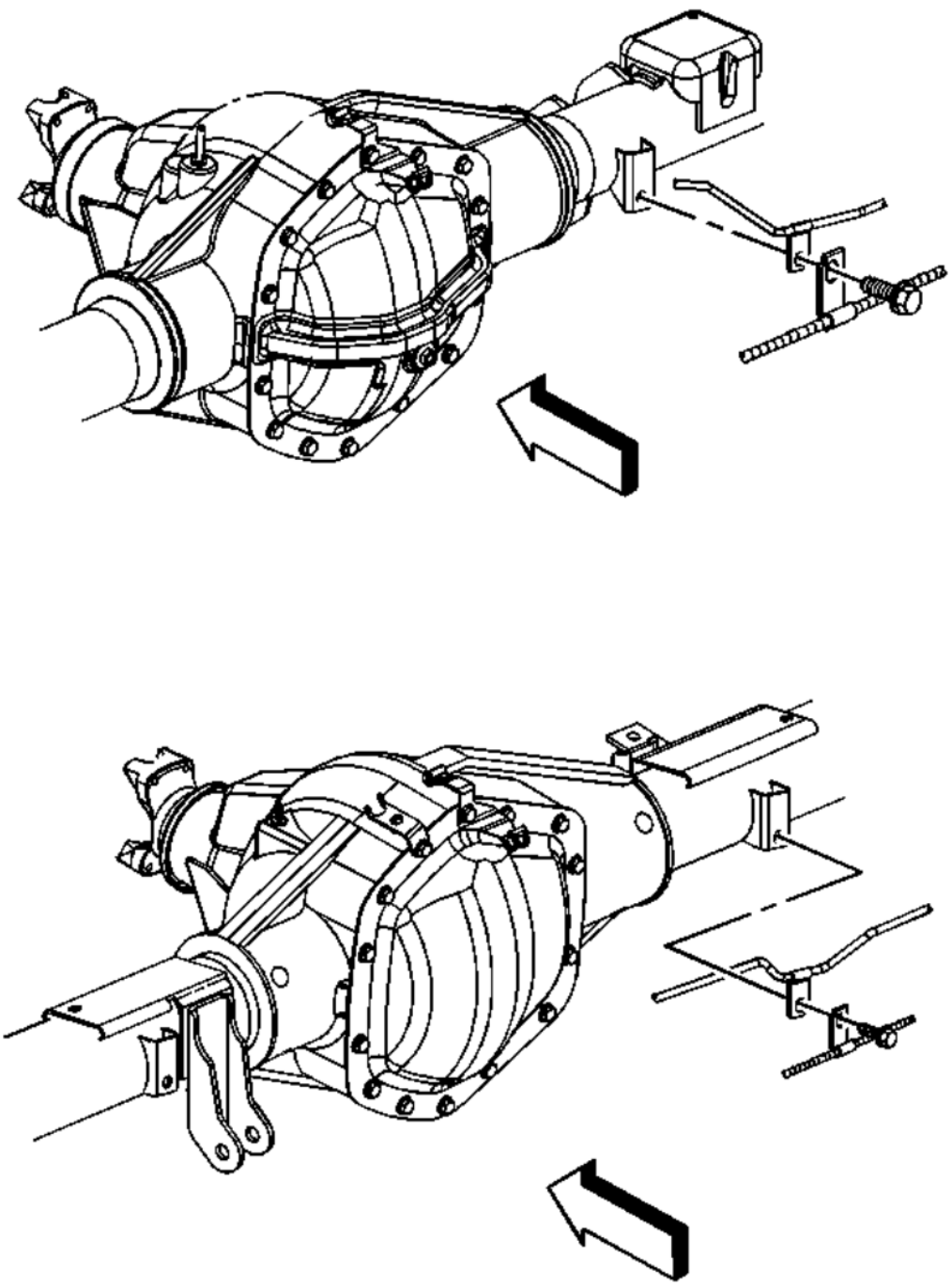
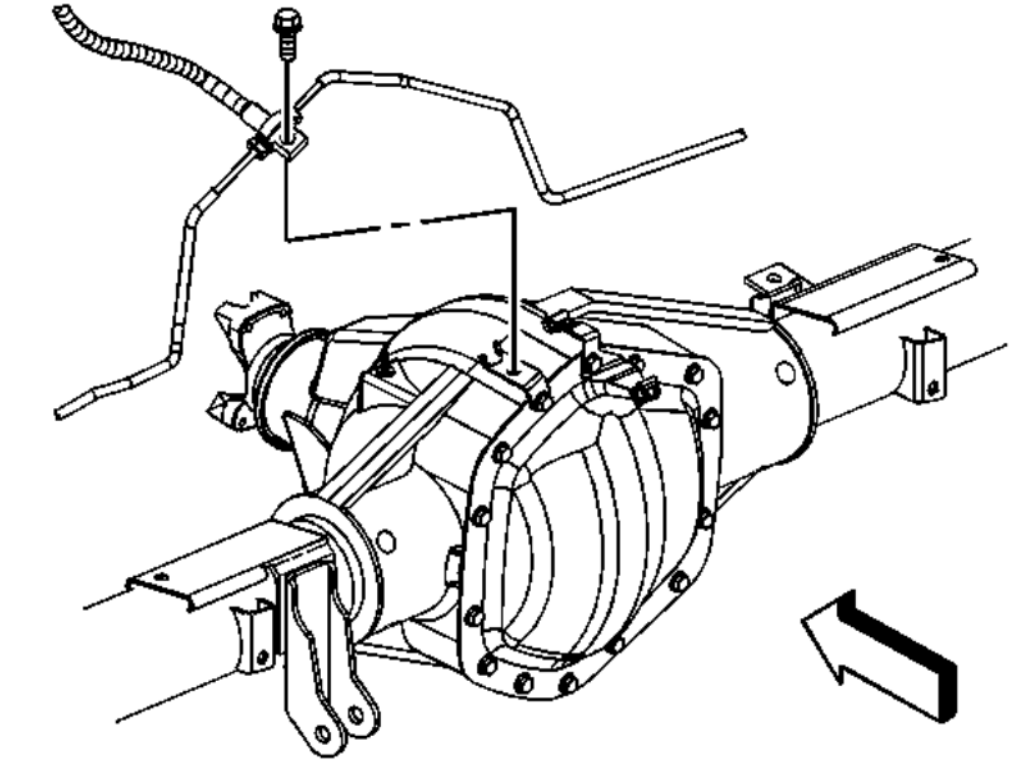


Fig. 210: View Of Brake Pipe
Courtesy of GENERAL MOTORS CORP.

12. Install the brake pipe.
13. Install the brake pipe bolts.

    Tighten: Tighten the bolts to 22 N.m (16 lb ft).



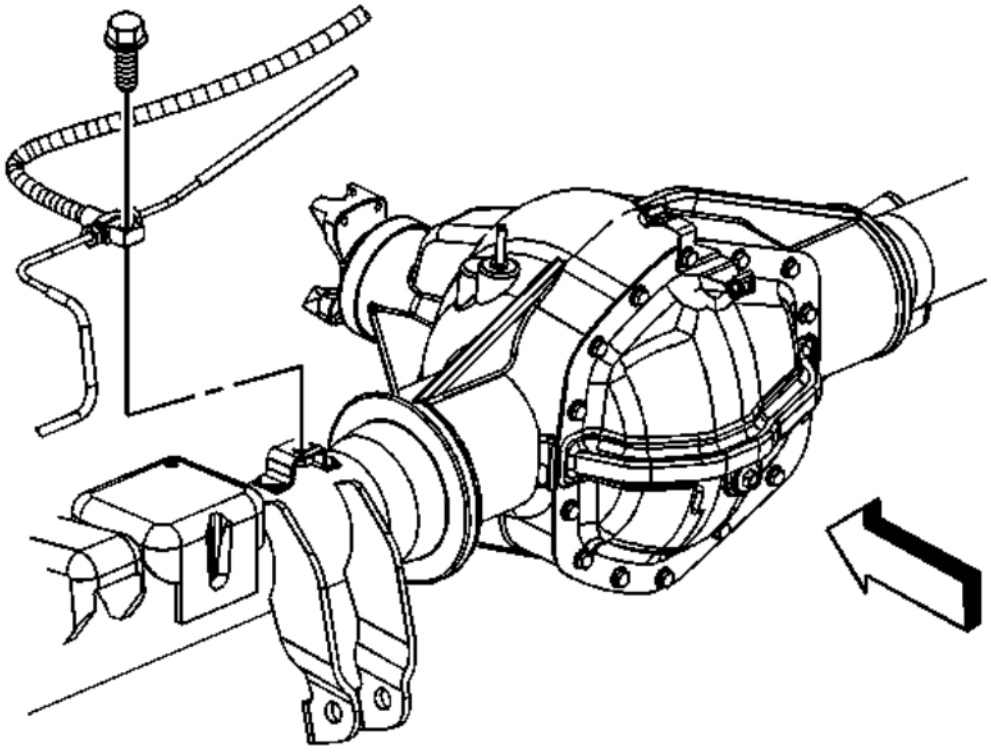


Fig. 211: View Of Junction Block
Courtesy of GENERAL MOTORS CORP.

14. Install the brake pipe junction block.
15. Install the brake pipe junction block bolt.

    Tighten: Tighten the brake pipe junction block bolt to 22 N.m (16 lb ft).

16. Connect the park brake cables. Refer to **Parking Brake Rear Cable Replacement - Left Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Left Side (JD9)** and **Parking Brake Rear Cable Replacement - Right Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Right Side (JD9)** .

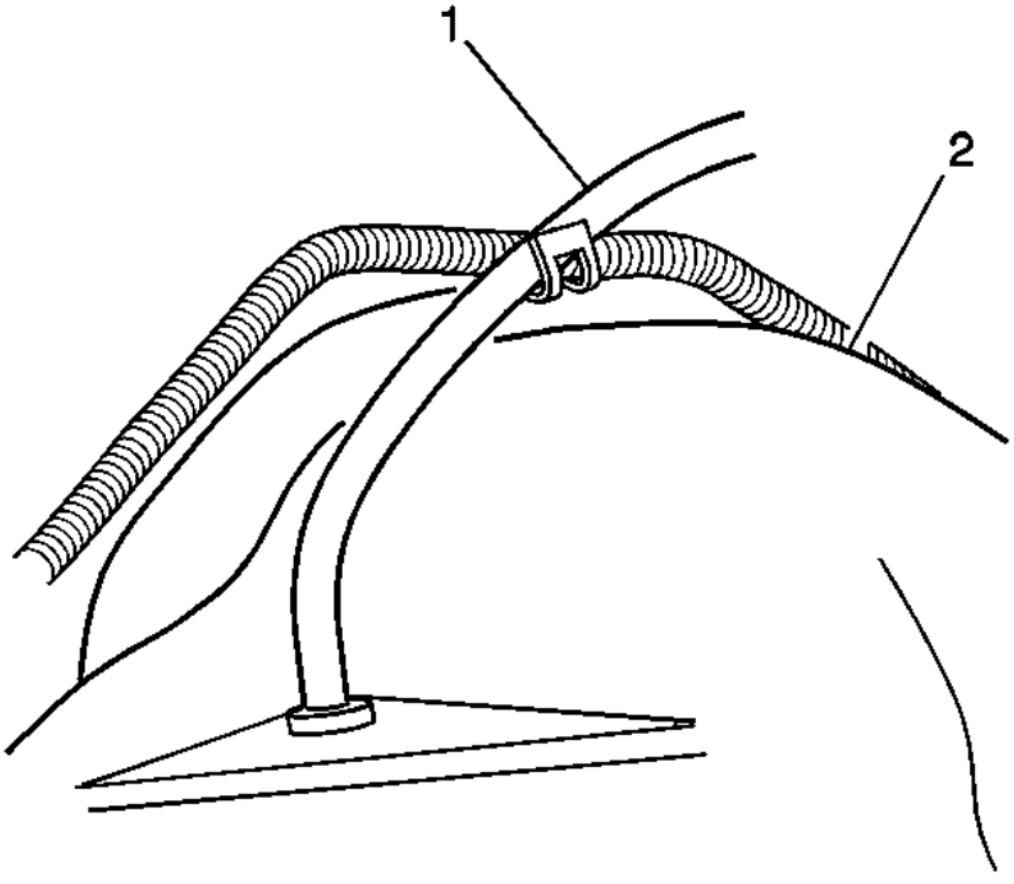


Fig. 212: Vent Hose & Rear Axle
Courtesy of GENERAL MOTORS CORP.

17. Connect the vent hose (1) to the axle vent fitting.

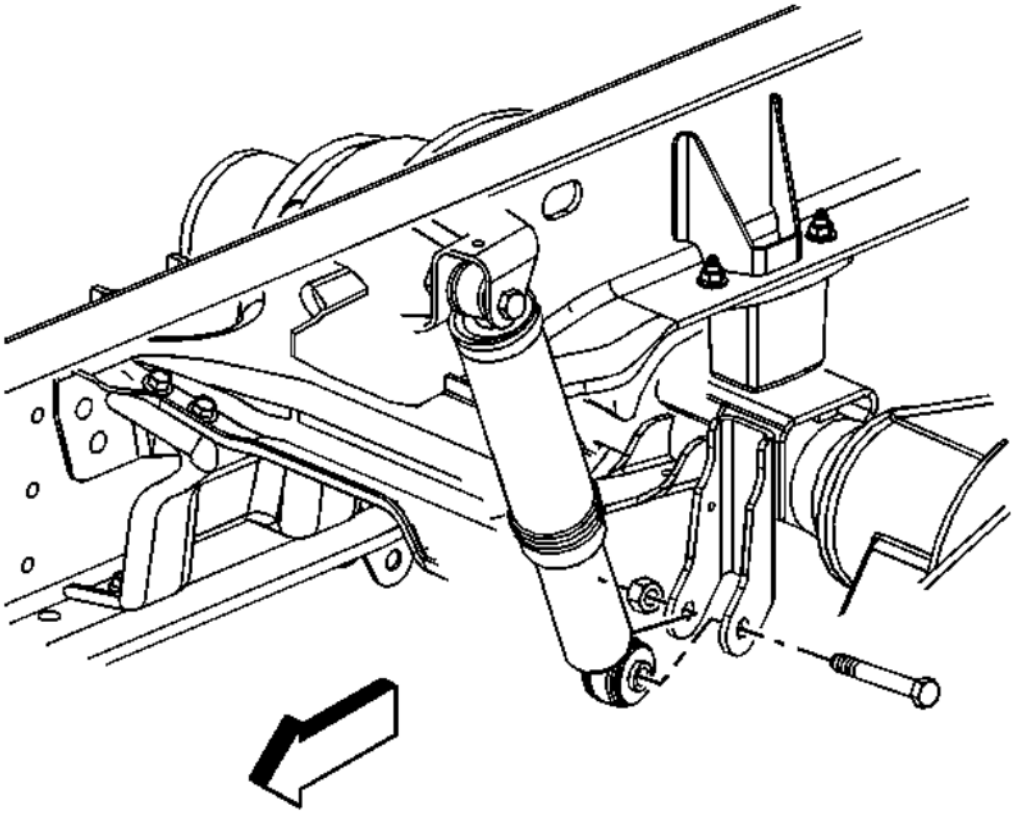


Fig. 213: Shock Absorber Lower Mount
Courtesy of GENERAL MOTORS CORP.

18. Install the shock absorbers to the lower mount bracket.
19. Install the shock absorber bolts and the nuts.

Tighten: Tighten the shock absorber nuts to 95 N.m (70 lb ft).

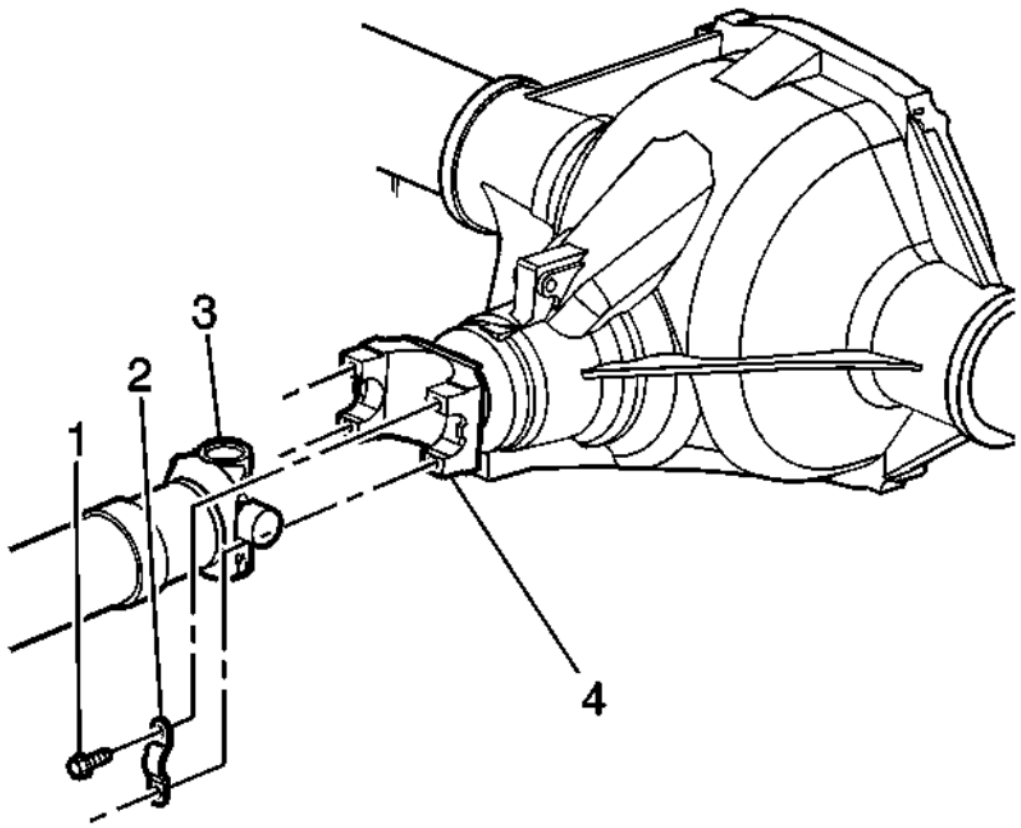


Fig. 214: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

20. Install the propeller shaft (3) to the pinion yoke (4).

    Align the reference marks made during removal.

21. Install the propeller shaft yoke retaining clamps (2) and the bolts (1).

    Tighten: Tighten the yoke retaining clamp bolts to 25 N.m (18 lb ft).

22. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
23. Fill the axle with lubricant. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .
24. Remove the jack and utility stands.

25. Lower the vehicle.

REAR AXLE HOUSING REPLACEMENT (W/REAR DRUM)

Removal Procedure

1. Remove the rear axle. Refer to **Rear Axle Replacement (15 Series with Drum Brakes)** or **Rear Axle Replacement (15/25 Series)** or **Rear Axle Replacement (35 Series)**.
2. Remove the rear axle cover housing and gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
3. Remove the rear wheel speed sensor. Refer to **Rear Wheel Speed Sensor Replacement**
4. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)**.

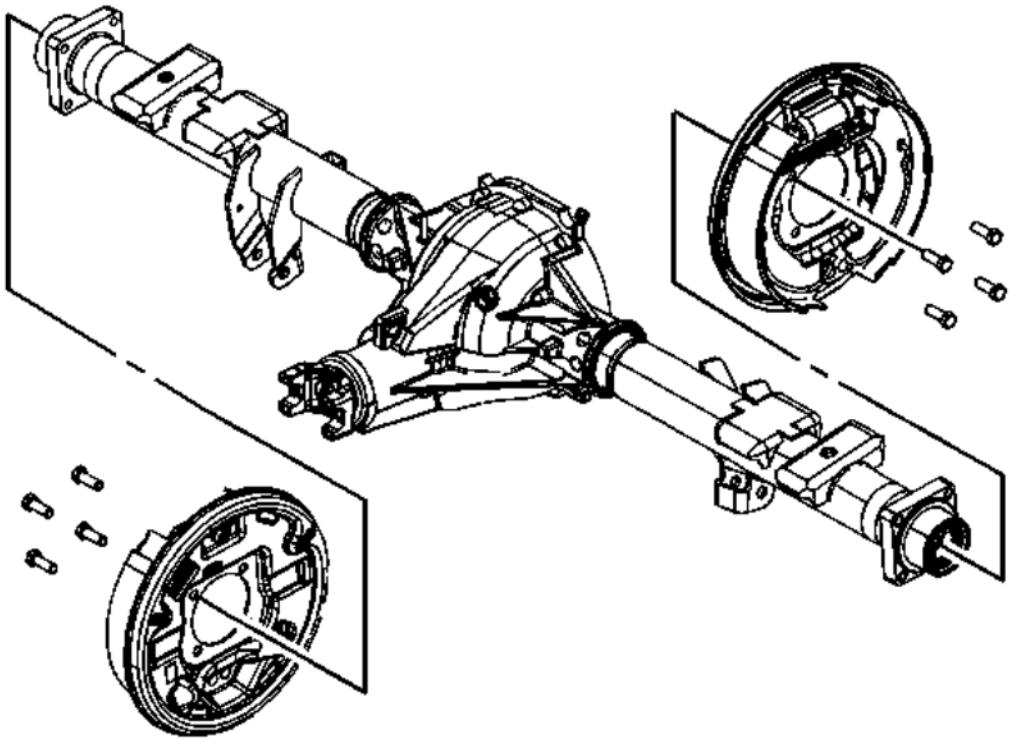


Fig. 215: Rear Brake Assemblies

Courtesy of GENERAL MOTORS CORP.

5. Remove the rear brake assembly bolts.
6. Remove the rear brake assemblies.
7. Remove the rear axle shaft oil seals and bearings. Refer to **Rear Axle Shaft Seal and/or Bearing Replacement (w/o VSES)** or **Rear Axle Shaft Seal and/or Bearing Replacement (w VSES)**.
8. Remove the drive pinion shaft yoke and oil seal. Refer to **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (All Except 9.75 Inch Axle)** or **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (8.6 Inch Axle w/Drum Brakes)**.
9. Remove the differential assembly. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
10. Remove the drive pinion and the inner pinion bearing. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
11. Remove the pinion bearing cups. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.

Installation Procedure

1. Install the pinion bearing cups. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
2. Install the drive pinion oil seal. Refer to **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (All Except 9.75 Inch Axle)** or **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (8.6 Inch Axle w/Drum Brakes)**.
3. Determine the selective shim thickness for the drive pinion. Refer to **Pinion Depth Adjustment (10.5 Inch Axle)** or **Pinion Depth Adjustment (8.6, 9.5/9.5LD, and 11.5 Inch Axles)**.
4. Install the inner pinion bearing onto the drive pinion. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
5. Install the drive pinion. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
6. Install the pinion yoke. Refer to **Drive Pinion Flange/Yoke and/or Oil Seal Replacement (All Except 9.75 Inch Axle)** or **Drive Pinion Flange/Yoke and/or Oil**

Seal Replacement (8.6 Inch Axle w/Drum Brakes).

7. Install the differential assembly. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
8. Adjust the differential side bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (10.5 Inch, 11.5 Inch Axles)** or **Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Carrier Bearing Preload Adjustment (9.5, and 9.5LD Inch Axles)**.
9. Adjust the drive pinion to ring gear backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
10. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.
11. Install the rear axle shaft oil seals and bearings. Refer to **Rear Axle Shaft Seal and/or Bearing Replacement (w/o VSES)** or **Rear Axle Shaft Seal and/or Bearing Replacement (w VSES)**.

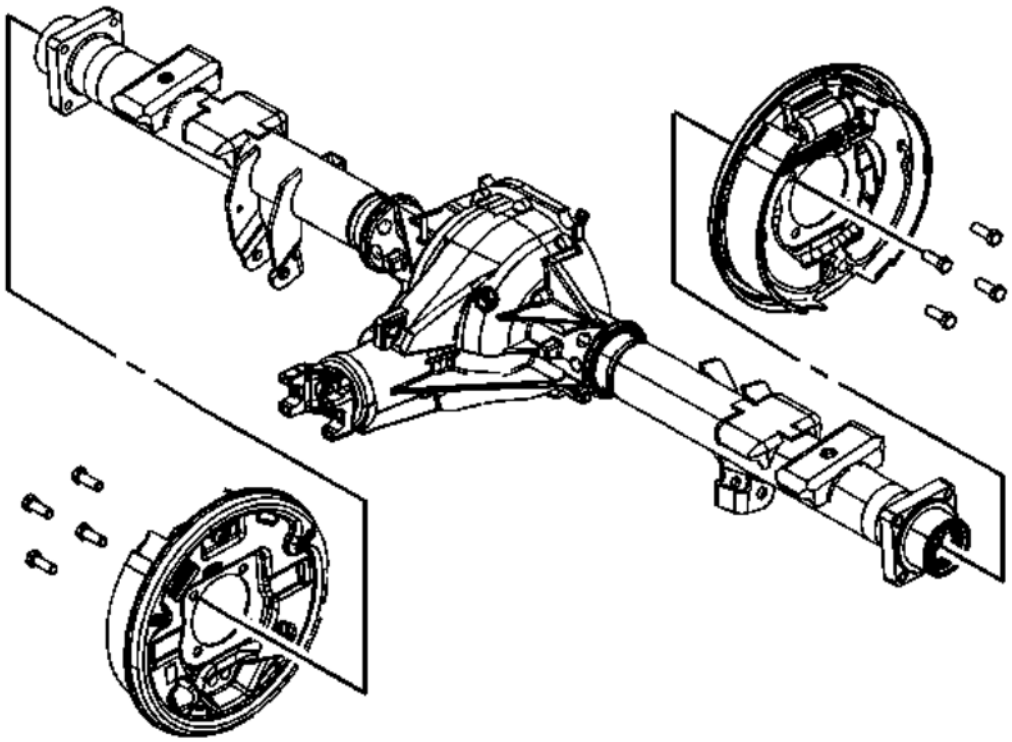


Fig. 216: Rear Brake Assemblies
Courtesy of GENERAL MOTORS CORP.

12. Install the rear brake assemblies.

NOTE: **Refer to Fastener Notice .**

13. Install the rear brake assembly bolts.

Tighten: Tighten the bolts to 135 N.m (100 lb ft).

14. Install the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brake w/VSES)** or **Rear Axle Shaft Replacement (8.6 Inch Axle w/Drum Brakes w/o VSES)** or **Rear Axle Shaft Replacement (8.6, 9.5 Inch Axles w/VSES)**
15. Install the rear axle cover housing and gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.

16. Install the rear axle. Refer to **Rear Axle Replacement (15 Series with Drum Brakes)** or **Rear Axle Replacement (15/25 Series)** or **Rear Axle Replacement (35 Series)**.
17. Install the rear wheel speed sensor. Refer to **Rear Wheel Speed Sensor Replacement** .

REAR AXLE HOUSING REPLACEMENT (W/REAR DISC)

Removal Procedure

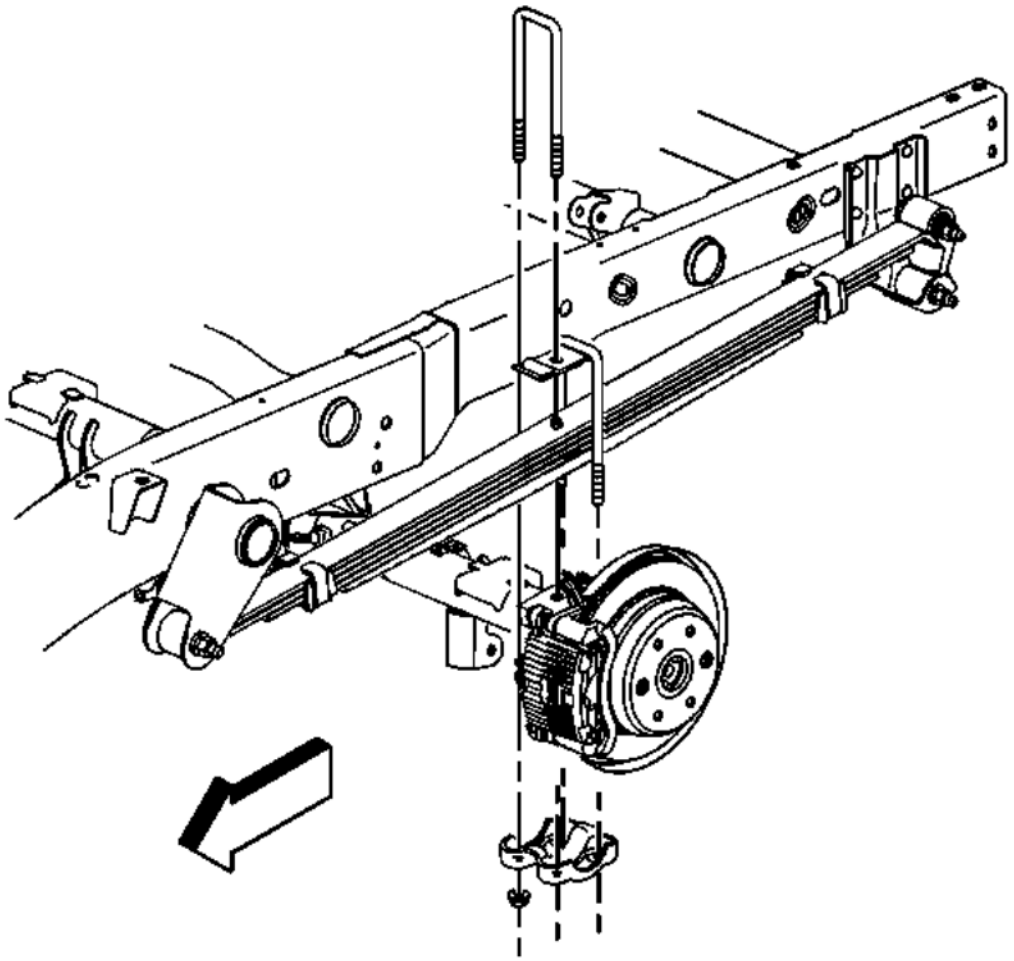


Fig. 217: Identifying U-Bolts
Courtesy of GENERAL MOTORS CORP.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Place jack or utility stands at the front end of the vehicle.
3. Drain the axle lubricant from the rear axle. Refer to **Rear Axle Lubricant Replacement (8.6 Inch Axle)** or **Rear Axle Lubricant Replacement (9.5 Inch LD Axle)** or **Rear Axle Lubricant Replacement (10.5 Inch Axle)**.
4. Disconnect the propeller shaft. Refer to **One-Piece Propeller Shaft Replacement** or **Two-Piece Propeller Shaft Replacement** .
5. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
6. Disconnect the wheel speed sensors. Refer to **Rear Wheel Speed Sensor Replacement** .
7. Disconnect the parking brake cable. Refer to **Parking Brake Rear Cable Replacement - Left Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Left Side (JD9)** and **Parking Brake Rear Cable Replacement - Right Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Right Side (JD9)** .
8. Remove the brake line bracket bolts. Suspend the brake lines from the vehicle with heavy mechanics wire.
9. Remove the brake calipers from the brake caliper mounting brackets. Do not disconnect the brake lines. Suspend the calipers from the vehicle with heavy mechanics wire. Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .
10. Disconnect the shock absorbers from the axle brackets. Refer to **Shock Absorber Replacement (1500)** or **Shock Absorber Replacement (2500, 3500)** .
11. Remove the vent hose from the rear axle vent fitting. Refer to **Vent Hose Replacement**.
12. Remove the nuts and the washers from the U-bolts.
13. Remove the U-bolts, the spring plates and the spacers form the axle assembly.
14. Lower the axle assembly.

Installation Procedure

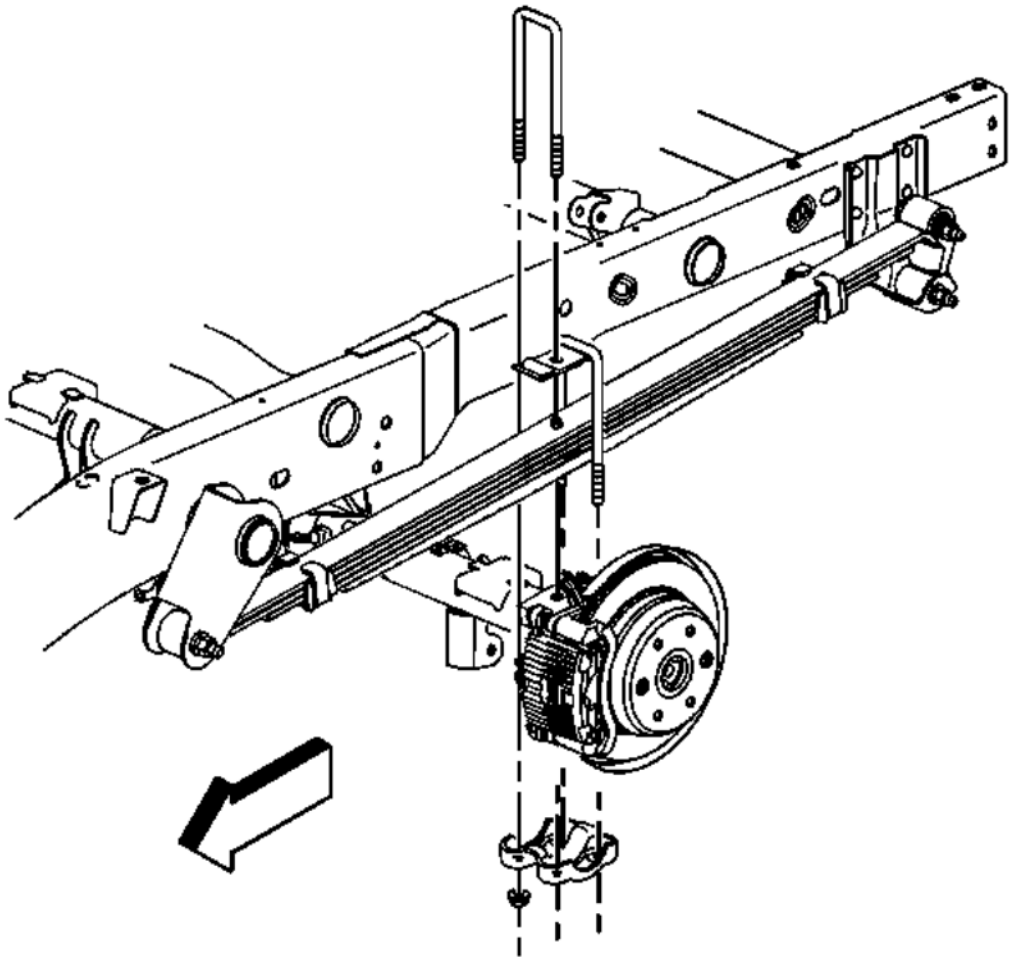


Fig. 218: Identifying U-Bolts
Courtesy of GENERAL MOTORS CORP.

1. Place the rear axle assembly under the vehicle.
2. Align the rear axle assembly with the springs.
3. Connect the spacers, the spring plates and the U-bolts to the rear axle.
4. Raise the rear axle assembly into position.

NOTE: Refer to Fastener Notice .

5. Install the washers if equipped and the nuts to the U-bolts.

Tighten:

- 15 Series tighten the nuts in a criss cross pattern to 72 N.m (53 lb ft).
- 25 series tighten the nuts in a criss cross pattern to 150 N.m (110 lb ft).

6. Install the vent hose to the rear axle vent fitting. Refer to **Vent Hose Replacement**.
7. Connect the shock absorbers to the rear axle. Refer to **Shock Absorber Replacement (1500)** or **Shock Absorber Replacement (2500, 3500)** .
8. Install the brake calipers. Refer to **Rear Brake Caliper Replacement (JH6, JH7)** or **Rear Brake Caliper Replacement (JD9)** .
9. Install the brake lines and the brake line bracket bolts to the axle.
10. Connect the parking brake cable. Refer to **Parking Brake Rear Cable Replacement - Left Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Left Side (JD9)** and **Parking Brake Rear Cable Replacement - Right Side (JF3, JF7)** or **Parking Brake Rear Cable Replacement - Right Side (JD9)** .
11. Connect the wheel speed senors. Refer to **Rear Wheel Speed Sensor Replacement** .
12. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
13. Connect the propeller shaft. Refer to **One-Piece Propeller Shaft Replacement** or **Two-Piece Propeller Shaft Replacement** .
14. Fill the axle with lubricant. Use the proper fluid. Refer to **Approximate Fluid Capacities** and **Fluid and Lubricant Recommendations** .
15. Remove the utility stands.
16. Lower the vehicle.

DIFFERENTIAL OVERHAUL (11.5 INCH AXLE)

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 22888-D** Side Bearing Remover Kit
- **J 44420** Differential Bearing and Hub Seal Installer. See **Special Tools**.

Disassembly Procedure

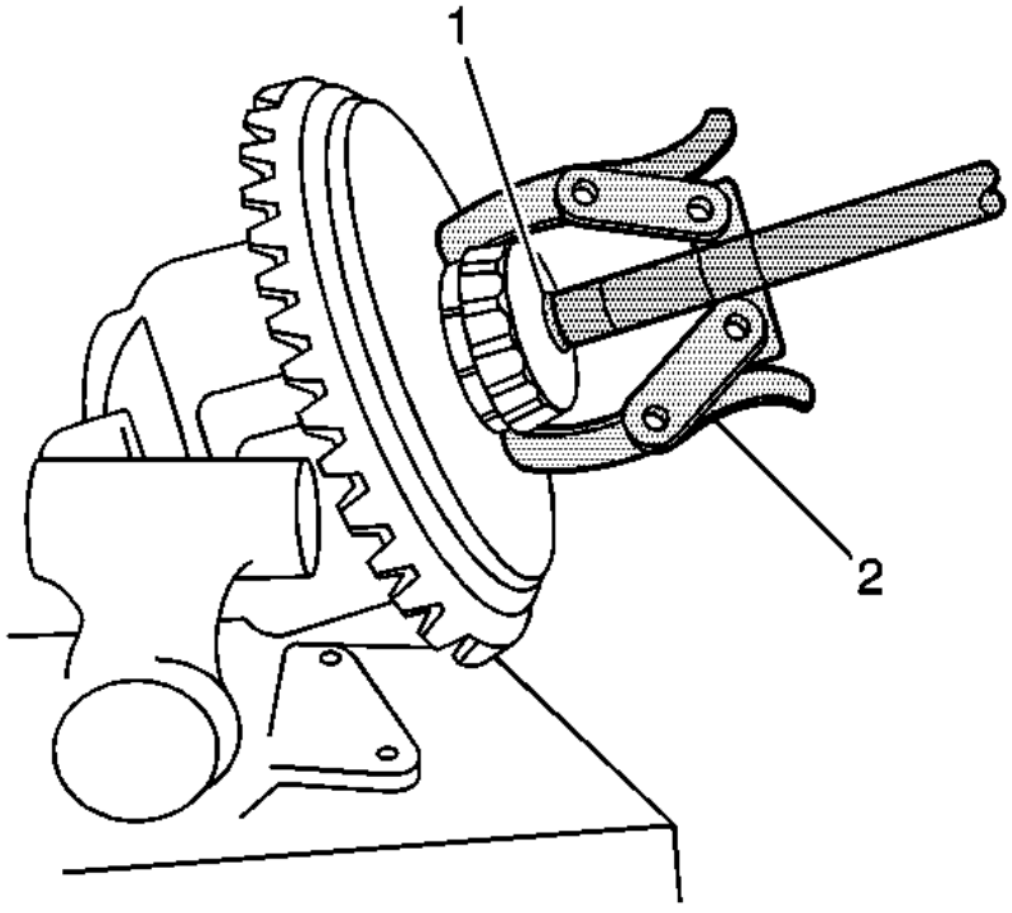


Fig. 219: Removing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

1. Remove the differential side bearings by performing the following steps:
    1. Install the differential assembly into a vise.
    2. Install the J 8107-5 (1) and the **J 22888-20A** (2) as shown. See **Special Tools**.
    3. Remove the differential side bearings using the **J 22888-20A** . See **Special Tools**.

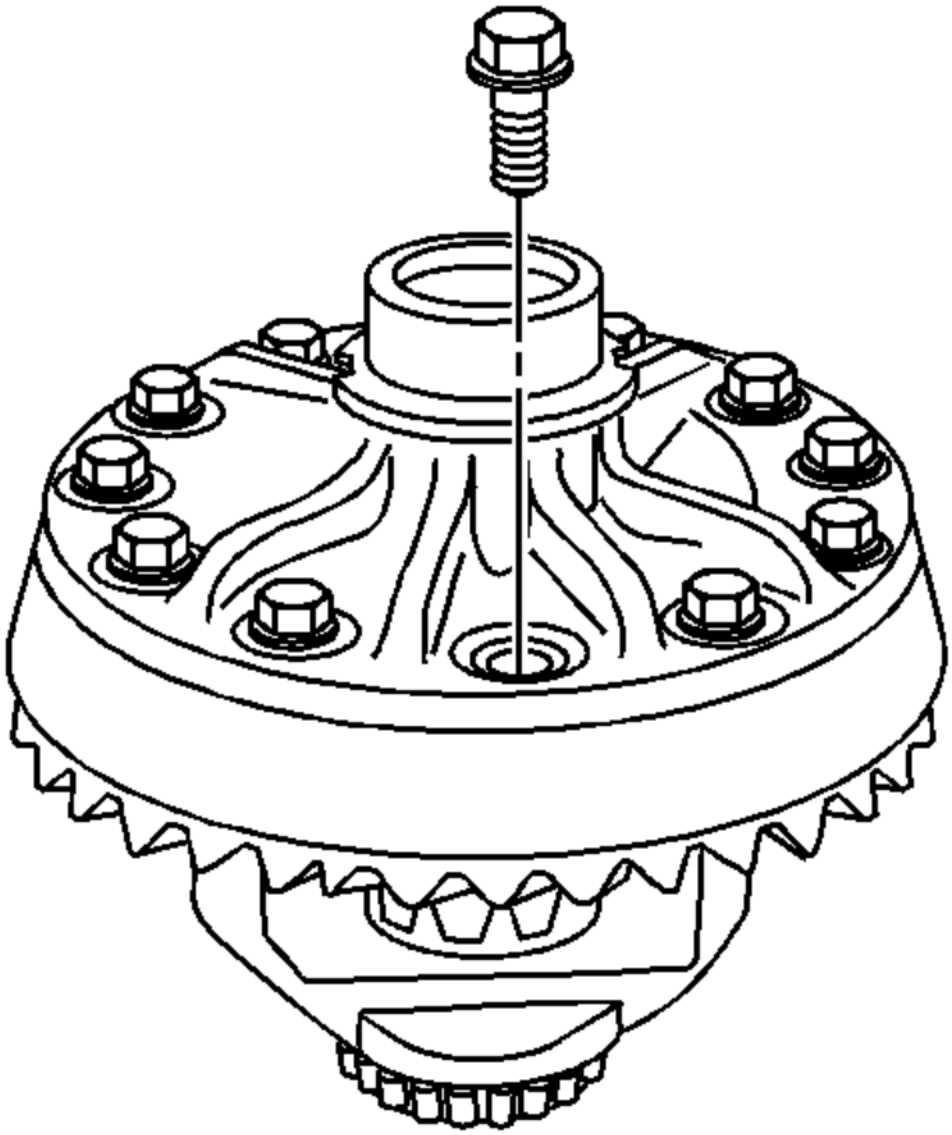


Fig. 220: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts have right-hand threads.

2. Remove the gear bolts. Discard the bolts.

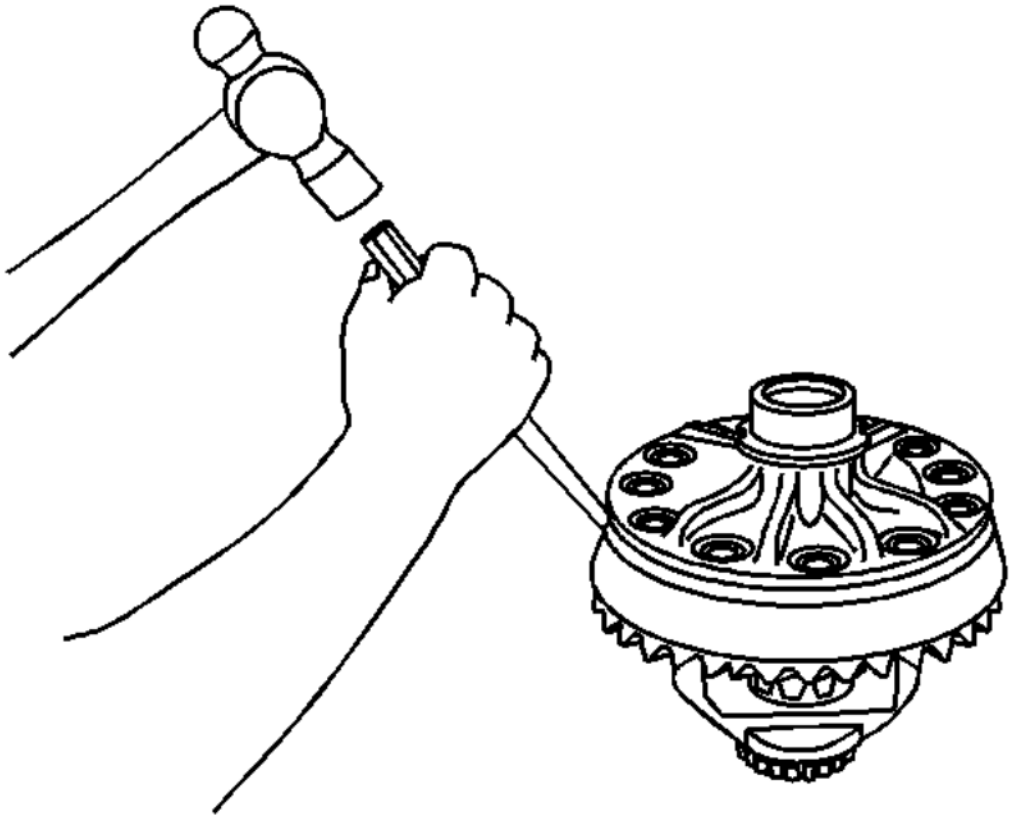


Fig. 221: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Ring Gear Removal Notice .

3. Remove the ring gear from the differential case.

   Drive the ring gear off with a brass drift if necessary.

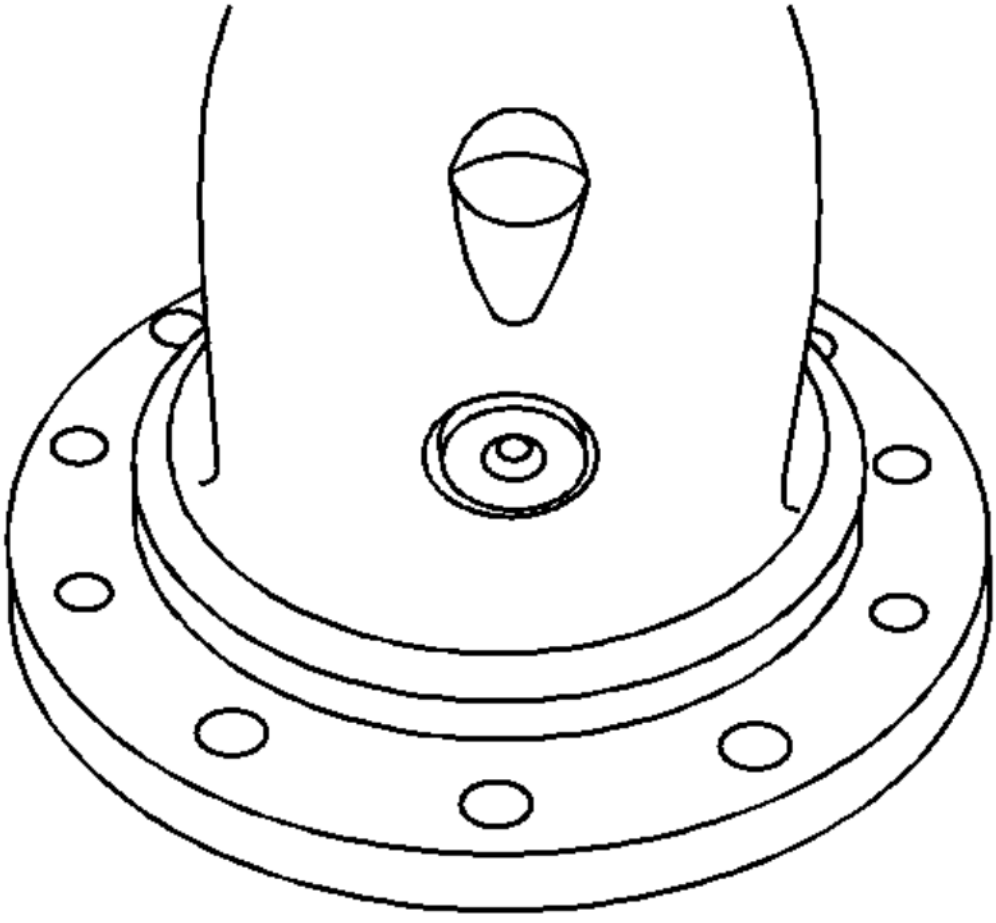


Fig. 222: Locating Pinion Shaft End
Courtesy of GENERAL MOTORS CORP.

4. Locate the end of the pinion shaft with the pilot hole.

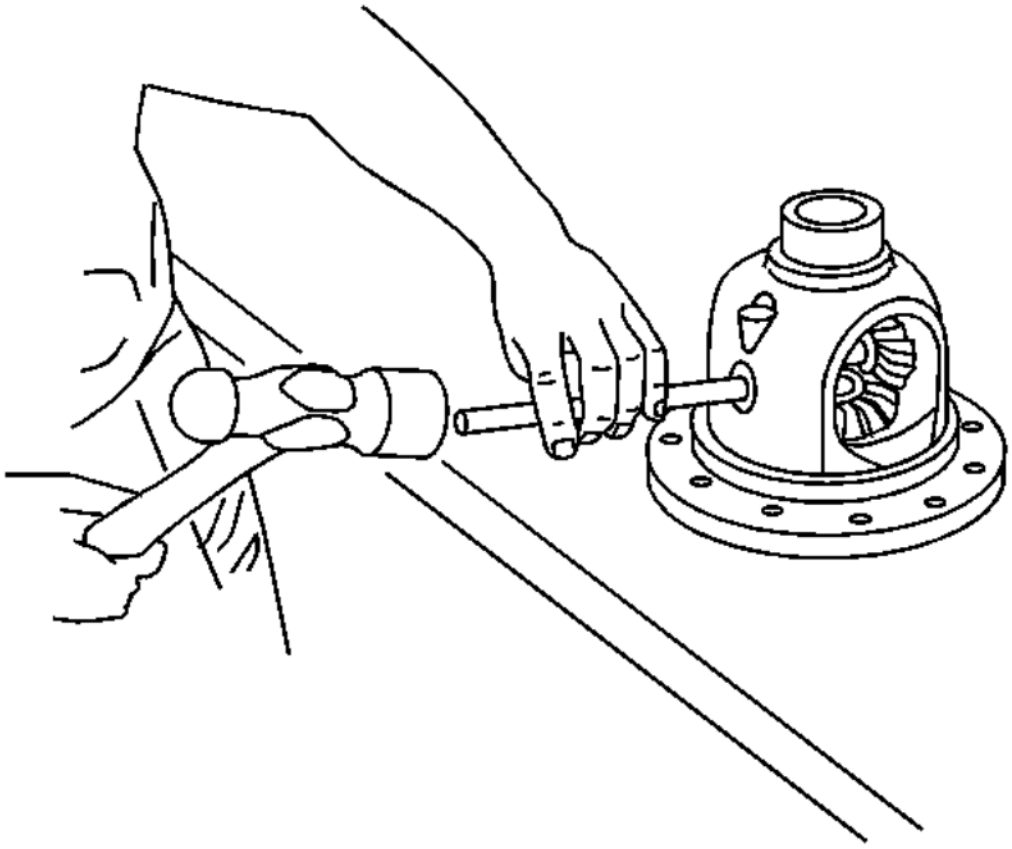


Fig. 223: Removing Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

5. Remove the pinion shaft by performing the following steps:
    1. Place a brass drift onto the end of the pinion shaft with the pilot hole.
    2. Drive the pinion shaft through the differential case using a hammer and the brass drift.



Fig. 224: View Of Pinion Shaft Retaining Ring
Courtesy of GENERAL MOTORS CORP.

6. Remove the retaining ring from the pinion shaft. Discard the retaining ring.

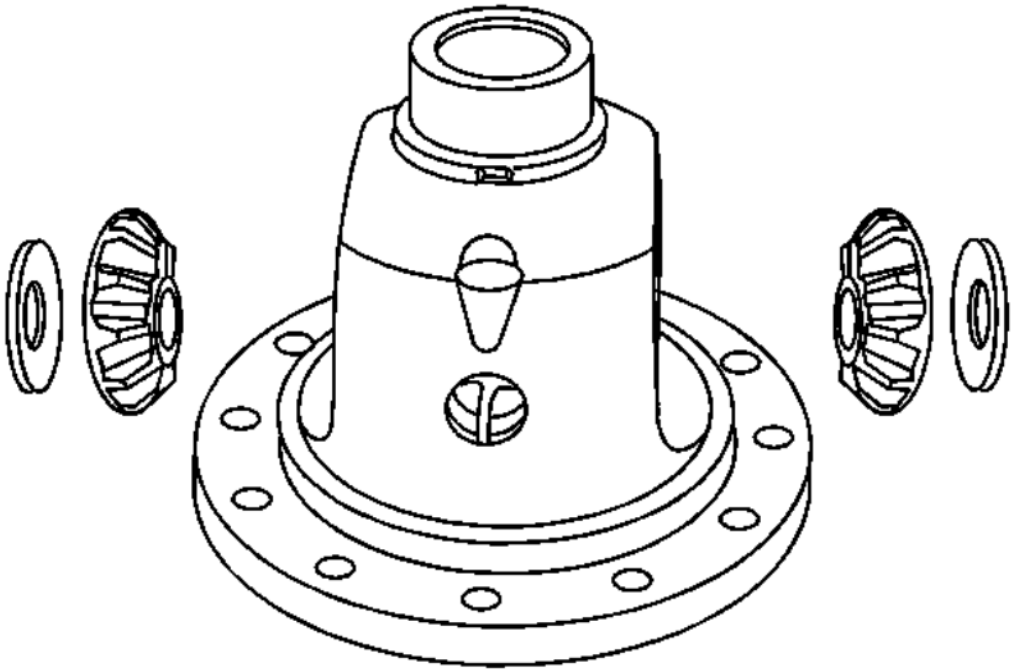


Fig. 225: View Of Differential Side Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

7. Remove the differential pinion gears and the pinion gear thrust washers by rolling the gears out through the differential case opening.
8. Remove the differential side gears and the thrust washers.

   Mark the pinion gears top and bottom and the differential side gears left and right.

Assembly Procedure



Fig. 226: View Of Pinion Shaft Retaining Ring
Courtesy of GENERAL MOTORS CORP.

1. Install the new retaining onto the pinion shaft.
2. Lubricate the pinion and side gears using axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
3. Install the differential side gear thrust washers to the differential side gears.
4. Install the differential side gears and thrust washers into the differential case.

   If the same differential side gears and the thrust washers are being used, install the gears and the thrust washers to their original locations.

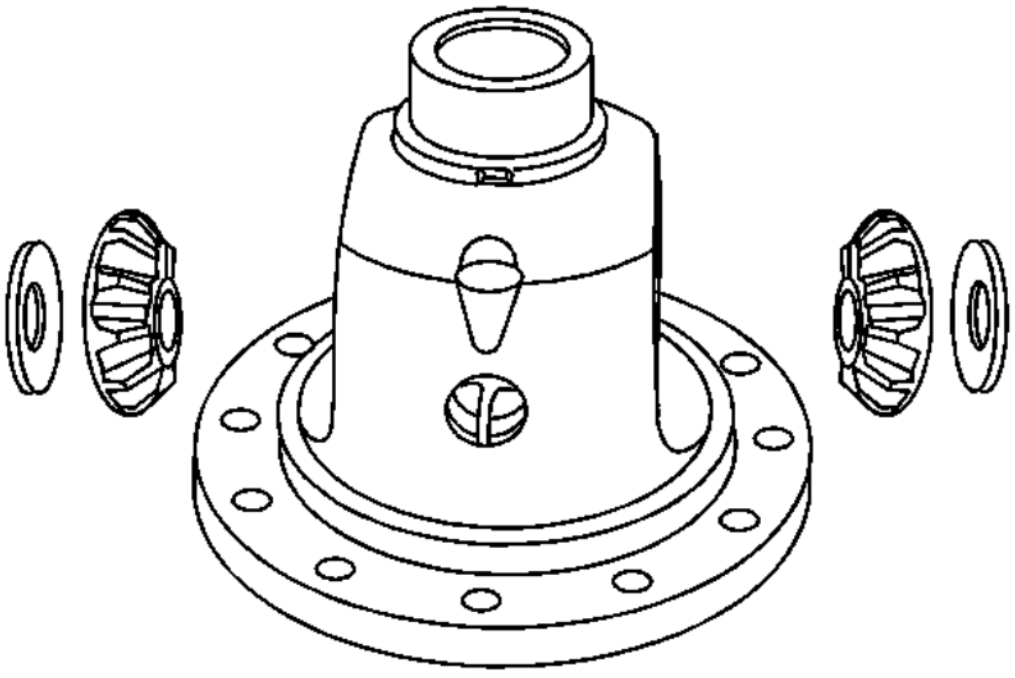


Fig. 227: View Of Differential Side Gears & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

5. Install the differential pinion gears and the thrust washers by performing the following steps:
    1. Install the thrust washers to the pinion gears.
    2. Position one of the pinion gears with the thrust washer between the differential side gears.

       If the same differential side gears and the thrust washers are being used, install the gears and the thrust washers to their original locations.

    3. Install the second pinion gear with the thrust washer between the differential side gears directly opposite of the first gear.
    4. Rotate the differential side gears until the pinion gears and the thrust washers are directly opposite the opening in the differential case.

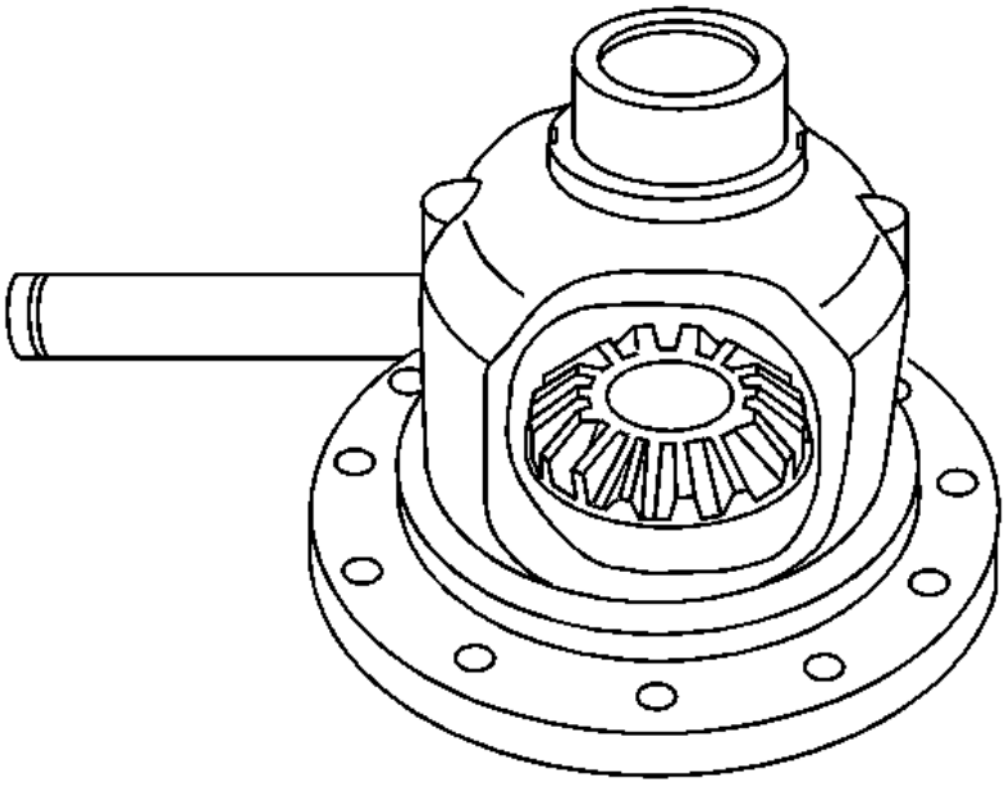


Fig. 228: View Of Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

6. Install the pinion shaft into the differential case by performing the following steps:
    1. Insert the side of the pinion shaft with the pilot hole into the differential case.
    2. Slide the pinion shaft through the differential case until the retaining ring is against the differential case.
    3. Carefully drive the pinion shaft into the differential case using a hammer and a brass drift.

       Ensure that the pinion shaft retaining ring is seated in the channel within the differential case.

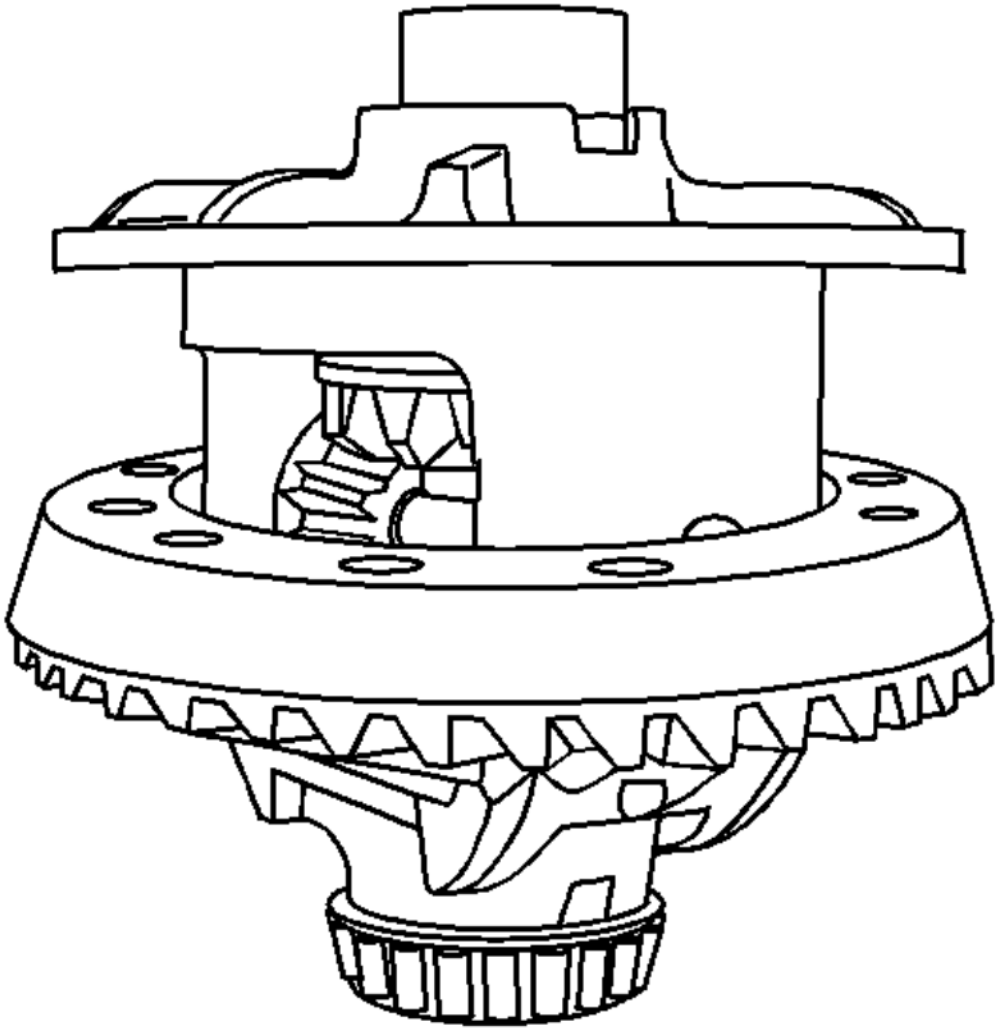


Fig. 229: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The mating surface of the ring gear and the differential case must be clean and free of burrs before installing the ring gear.

7. Install the ring gear to the differential case.

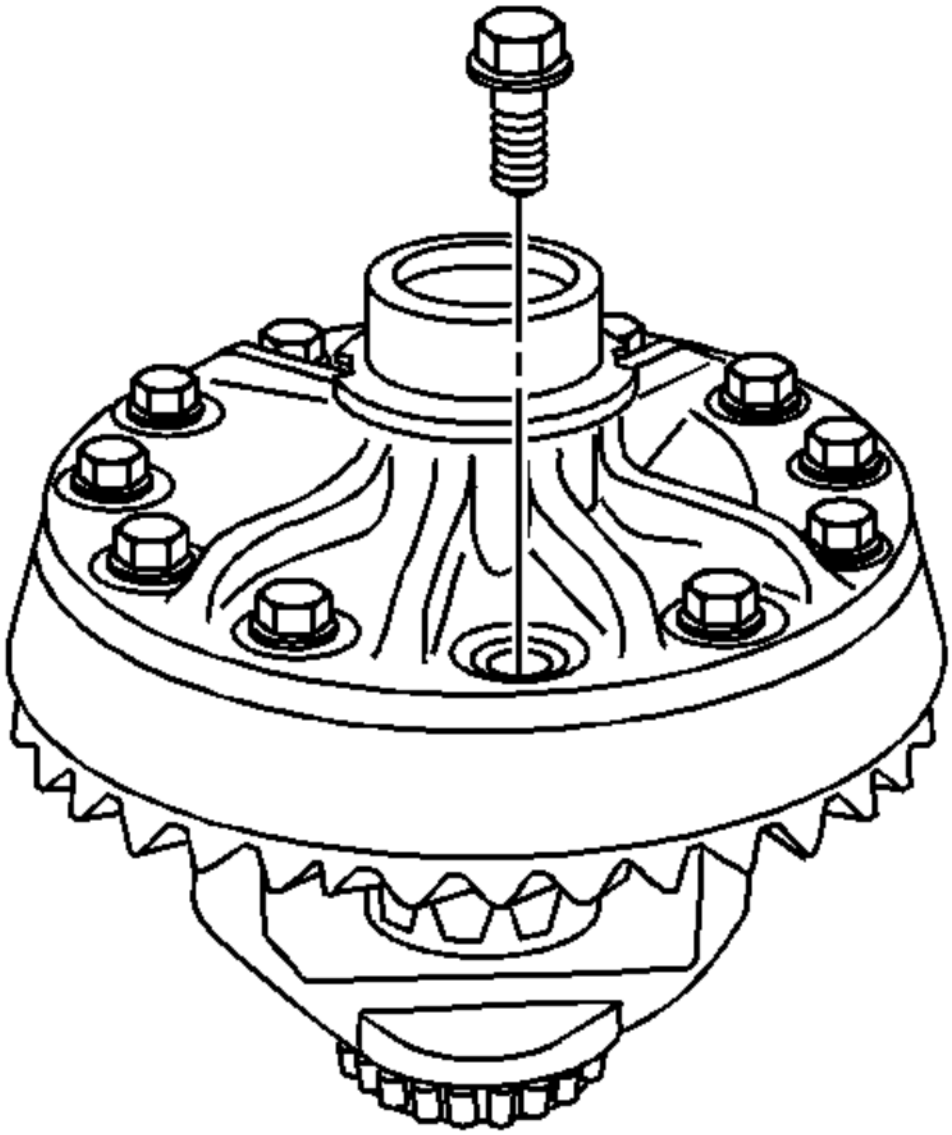


Fig. 230: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to **Fastener Notice** .

IMPORTANT: The ring gear bolts have right - hand threads.

8. Install the new ring gear bolts.

   Hand start each bolt in ensure the ring gear is properly installed to the differential case.

9. Tighten the ring gear bolts. Tighten the bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

   Tighten: Tighten the ring gear bolts in sequence to 237 N.m (175 lb ft).

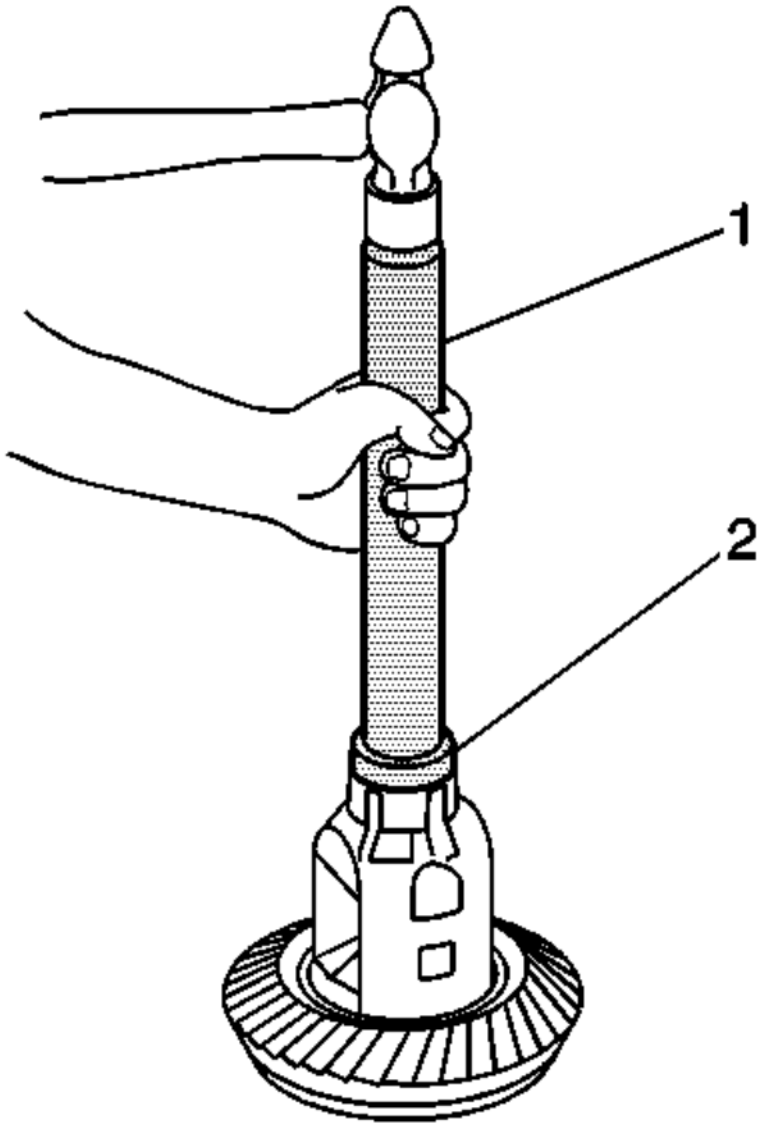


Fig. 231: Driving Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS CORP.

10. Install the differential side bearings by performing the following steps:
    1. In order to protect the differential case, install the J 8107-5 in the case on the side opposite the bearing installation.

2. Install the **J 44420** (2) and the **J 8092** (1) onto the differential case bearing as shown. See **Special Tools**.
3. Drive the bearing onto the case using the **J 44420** and the **J 8092** . See **Special Tools**.

DIFFERENTIAL OVERHAUL (9.5/9.5LD INCH AXLES)

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 22888-D** Side Bearing Puller Kit
- **J 29710** Differential Side Bearing Installer
- **J 36597** Side Bearing Puller Pilot - 9.25 inch

Disassembly Procedure

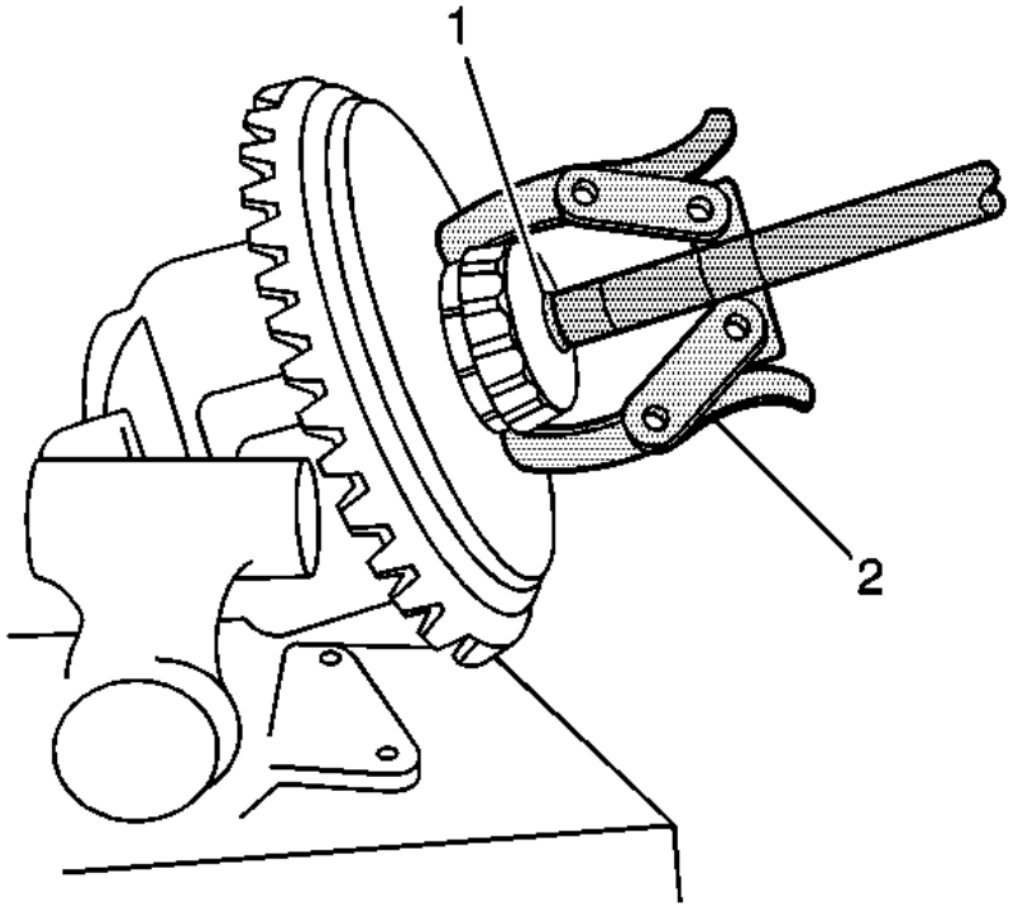


Fig. 232: Removing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

1. Remove the differential side bearings by performing the following steps:
    1. Install the differential assembly into a vise.
    2. Install the **J 36597** (1) and the **J 22888-20A** (2) as shown. See **Special Tools**.
    3. Remove the differential side bearings using the **J 22888-20A** . See **Special Tools**.

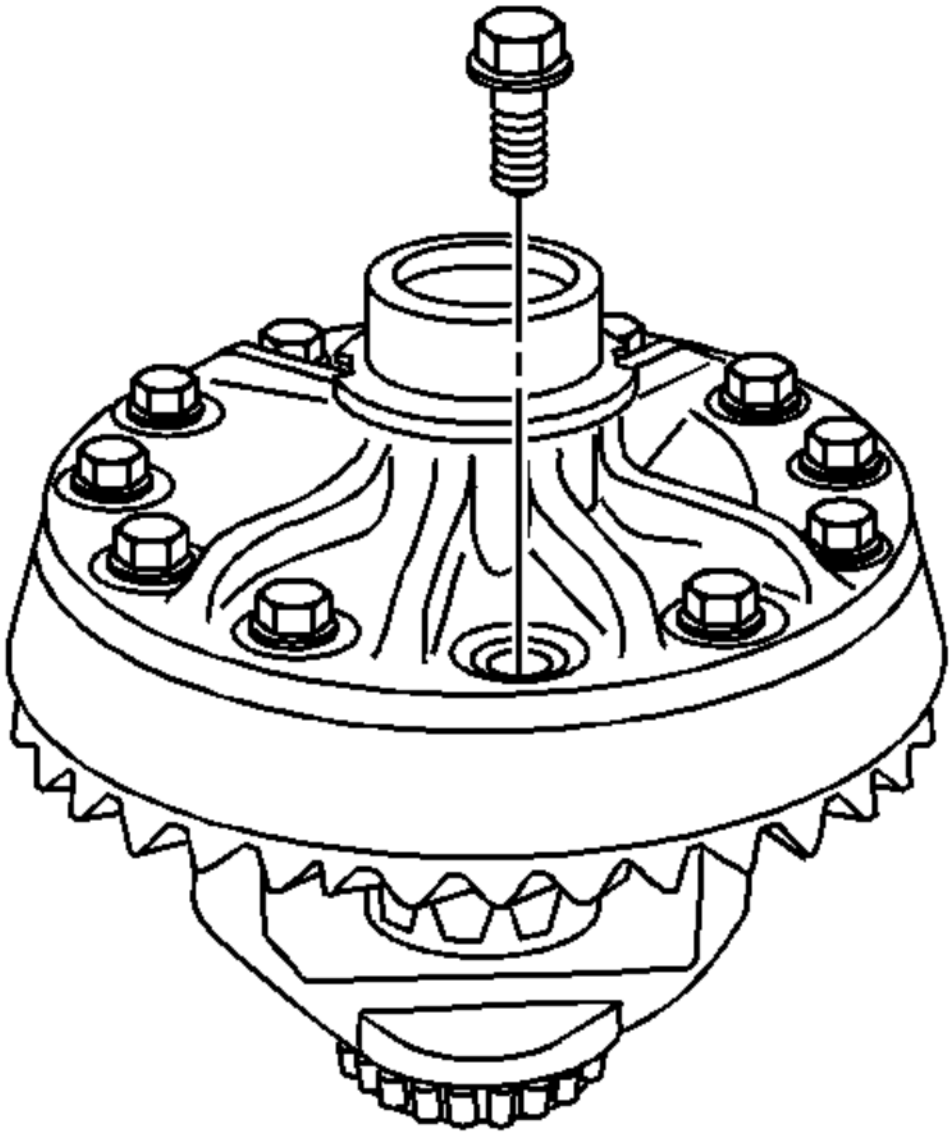


Fig. 233: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts have left-hand threads.

2. Remove the gear bolts. Discard the bolts.

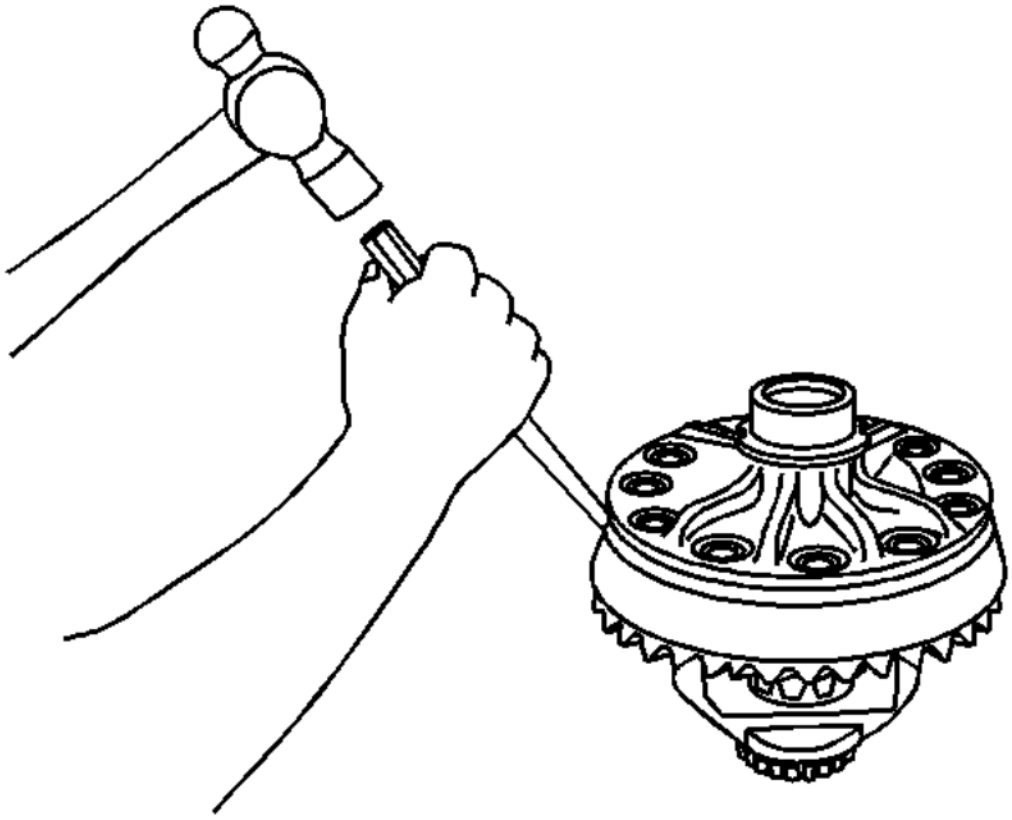


Fig. 234: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Ring Gear Removal Notice .

3. Remove the ring gear from the differential case.

   Drive the ring gear off with a brass drift if necessary.

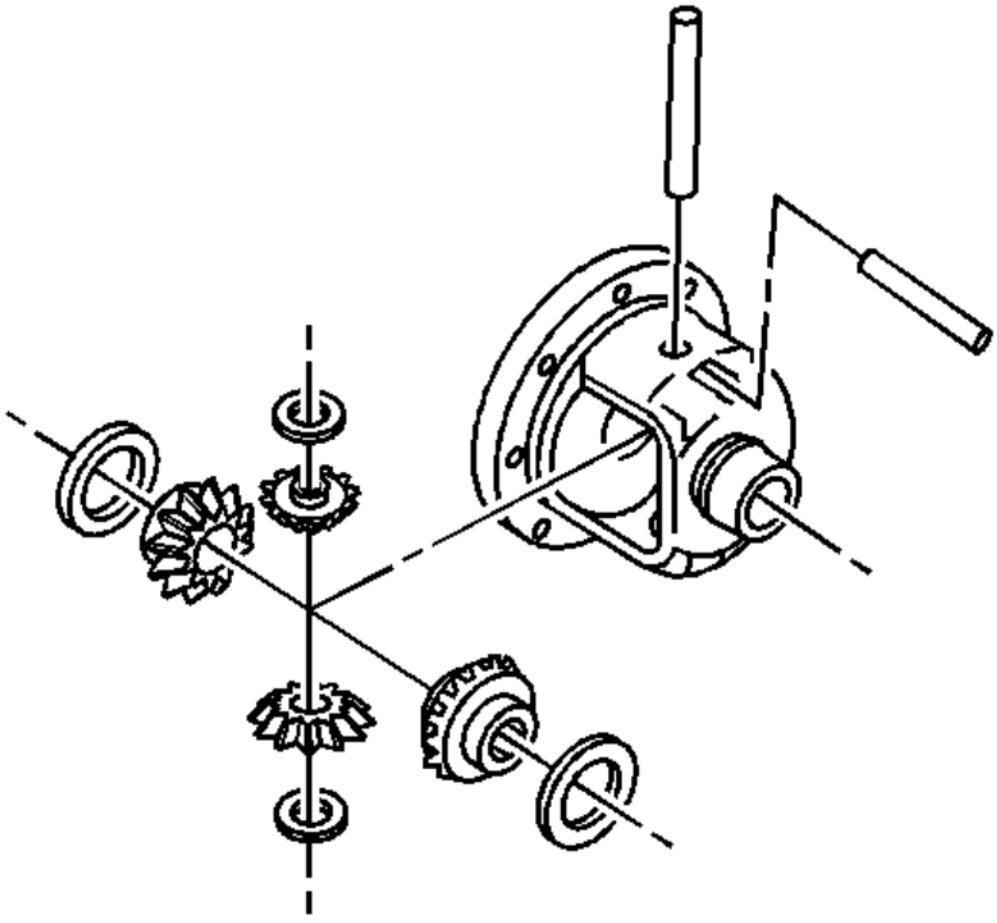


Fig. 235: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

4. Remove the differential pinion gears and the differential side gears by performing the following steps:
    1. Remove the pinion shaft lock bolt.
    2. Remove the pinion shaft.
    3. Drive the pinion gear thrust washer out from the differential case using a hammer and a brass drift.
    4. Roll the differential pinion gears out of the differential case.

5. Remove the differential side gears and the side gear thrust washers.

   Mark the pinion gears top and bottom and the differential side gears left and right.

Assembly Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
2. Install the differential side gear thrust washers to the differential side gears.
3. Install the differential side gears and thrust washers into the differential case.

   If the same differential side gears and the thrust washers are being used, install the gears and the thrust washers to their original locations.

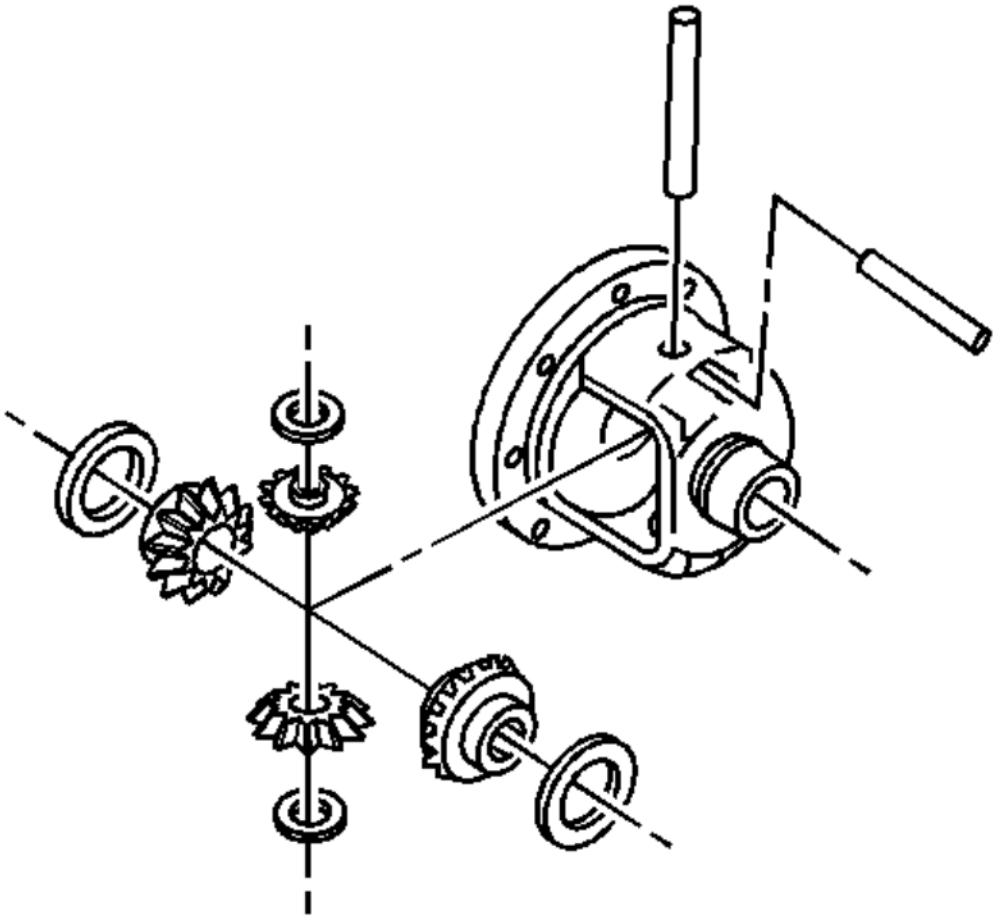


Fig. 236: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

4. Install the differential pinion gears by performing the following steps:
    1. Position one of the pinion gears between the differential side gears.
    2. Install the second pinion gear directly opposite of the first gear between the differential side gears.
    3. Rotate the differential side gears until the pinion gears are directly opposite the opening in the differential case.
    4. Install the pinion gear thrust washers using a hammer and a brass drift.

5. Install the pinion shaft.

NOTE: **Refer to Fastener Notice .**

6. Install a new pinion shaft lock bolt.

Tighten: Tighten the new pinion shaft lock bolt to 50 N.m (37 lb ft).

IMPORTANT: The mating surface of the ring gear and the differential case must be clean and free of burrs before installing the ring gear.

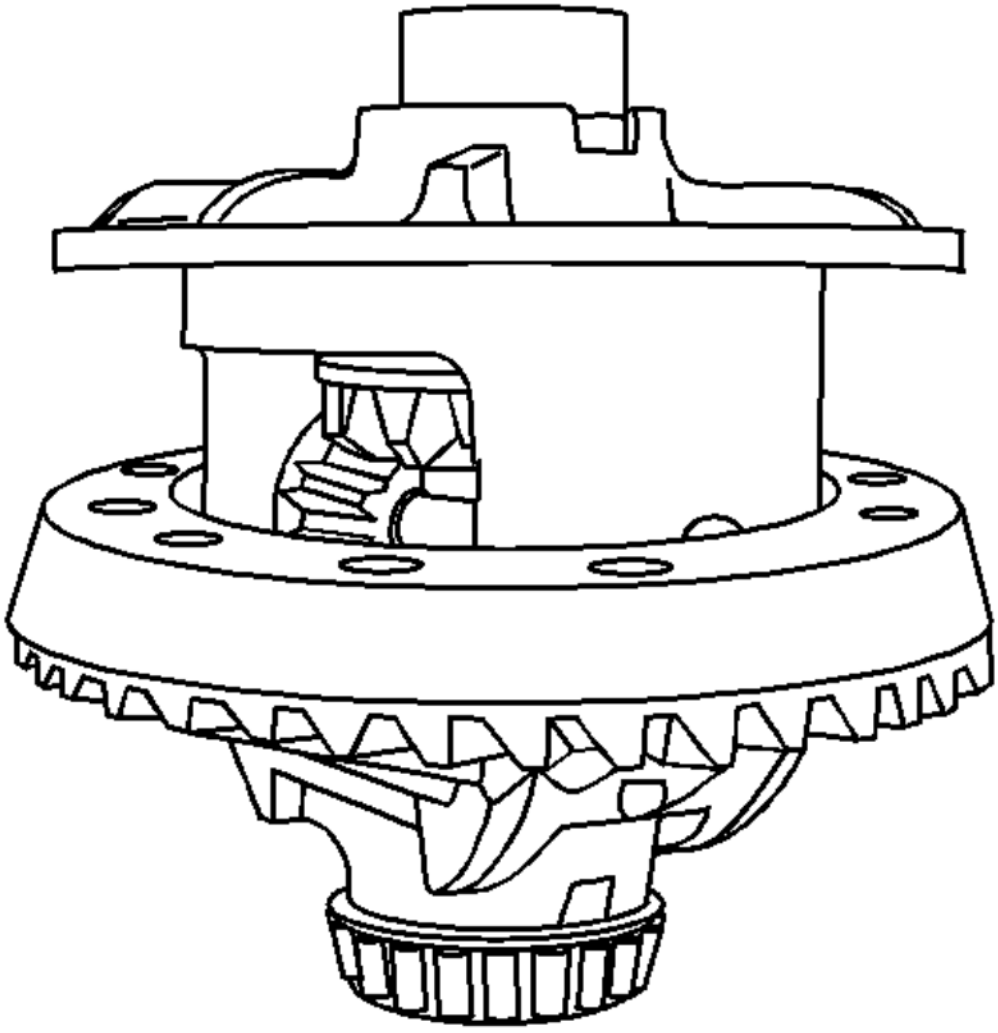


Fig. 237: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

7. Install the ring gear to the differential case.

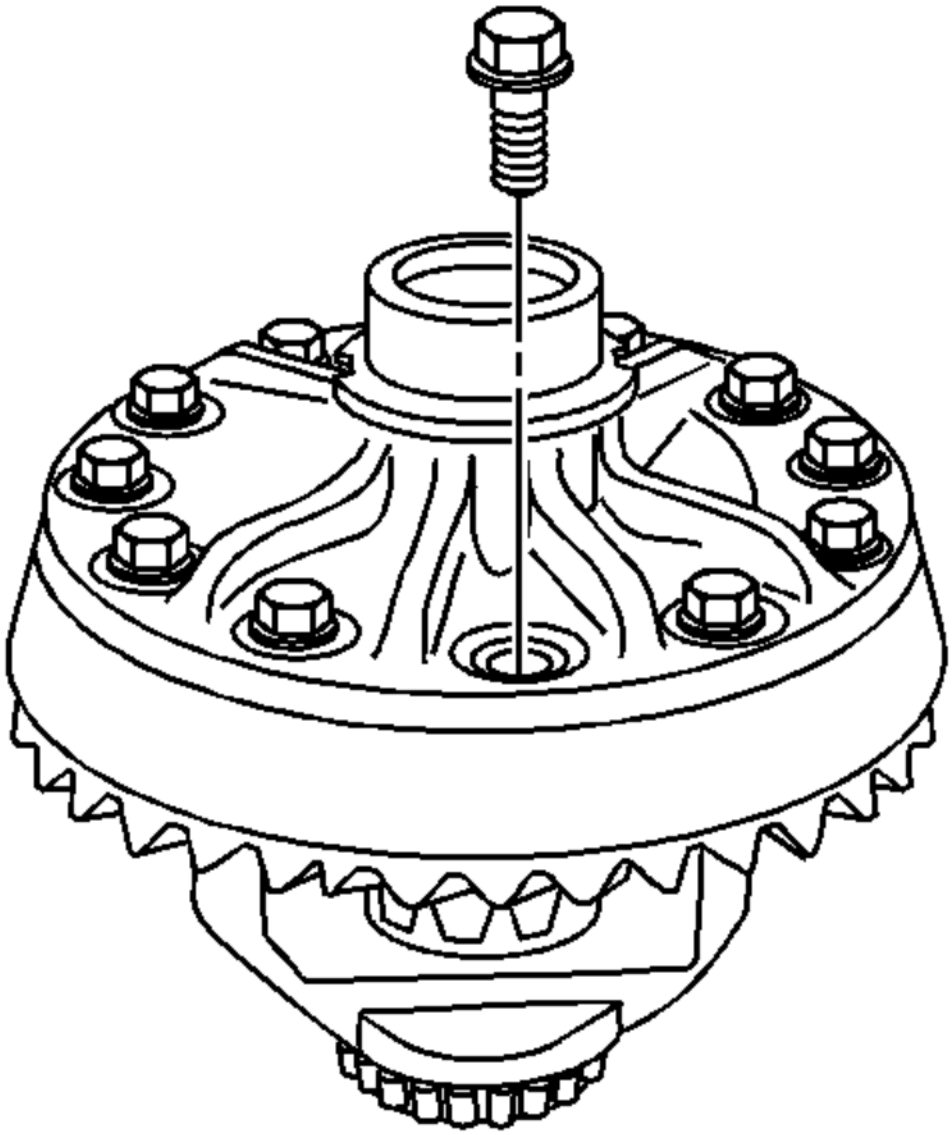


Fig. 238: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts have left - hand threads.

8. Install the new ring gear bolts.

Hand start each bolt to ensure that the ring gear is properly installed to the differential case.

9. Tighten the ring gear bolts. Tighten the bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

   Tighten: Tighten the ring gear bolts in sequence to 140 N.m (103 lb ft).

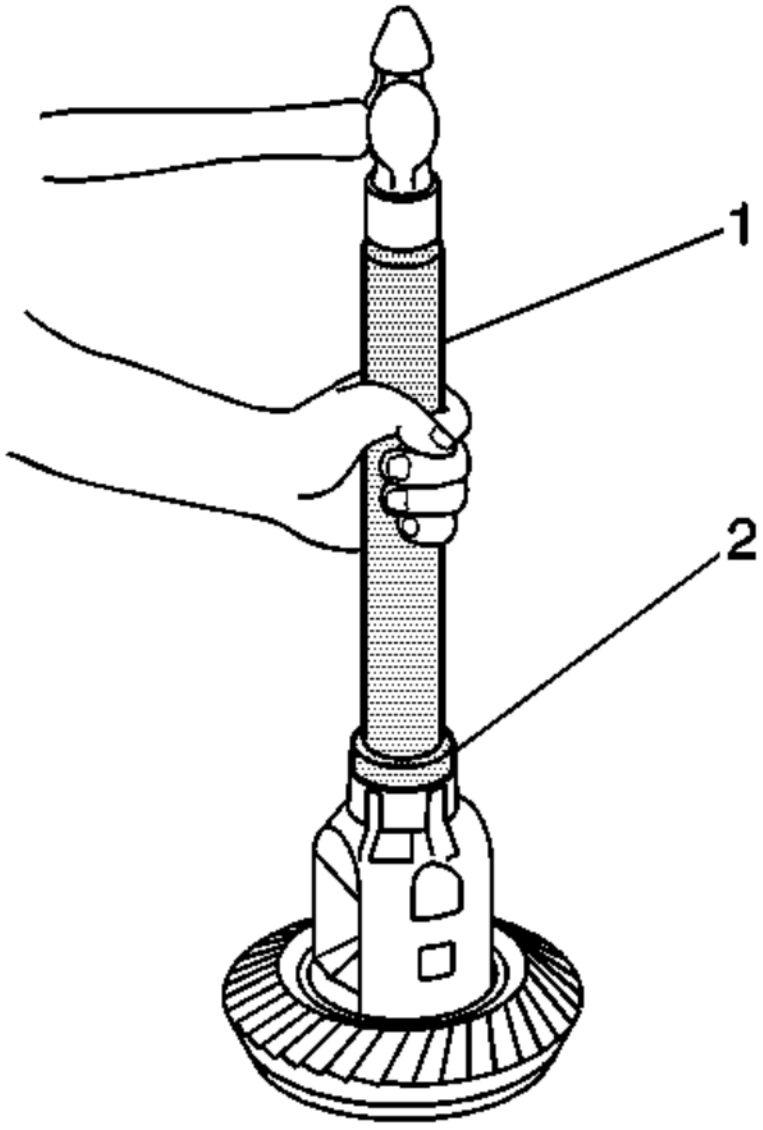


Fig. 239: Driving Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS CORP.

10. Install the differential side bearings by performing the following steps:
    1. In order to protect the differential case, install the **J 36597** in the case on the side opposite the bearing installation.
    2. Install the **J 29710** (2) and the **J 8092** (1) onto the differential case bearing as shown.
    3. Drive the bearing onto the case using the **J 29710** and the **J 8092** .

DIFFERENTIAL OVERHAUL (8.6 INCH AXLE)

Disassembly Procedure

1. Remove the differential side bearings. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)**.

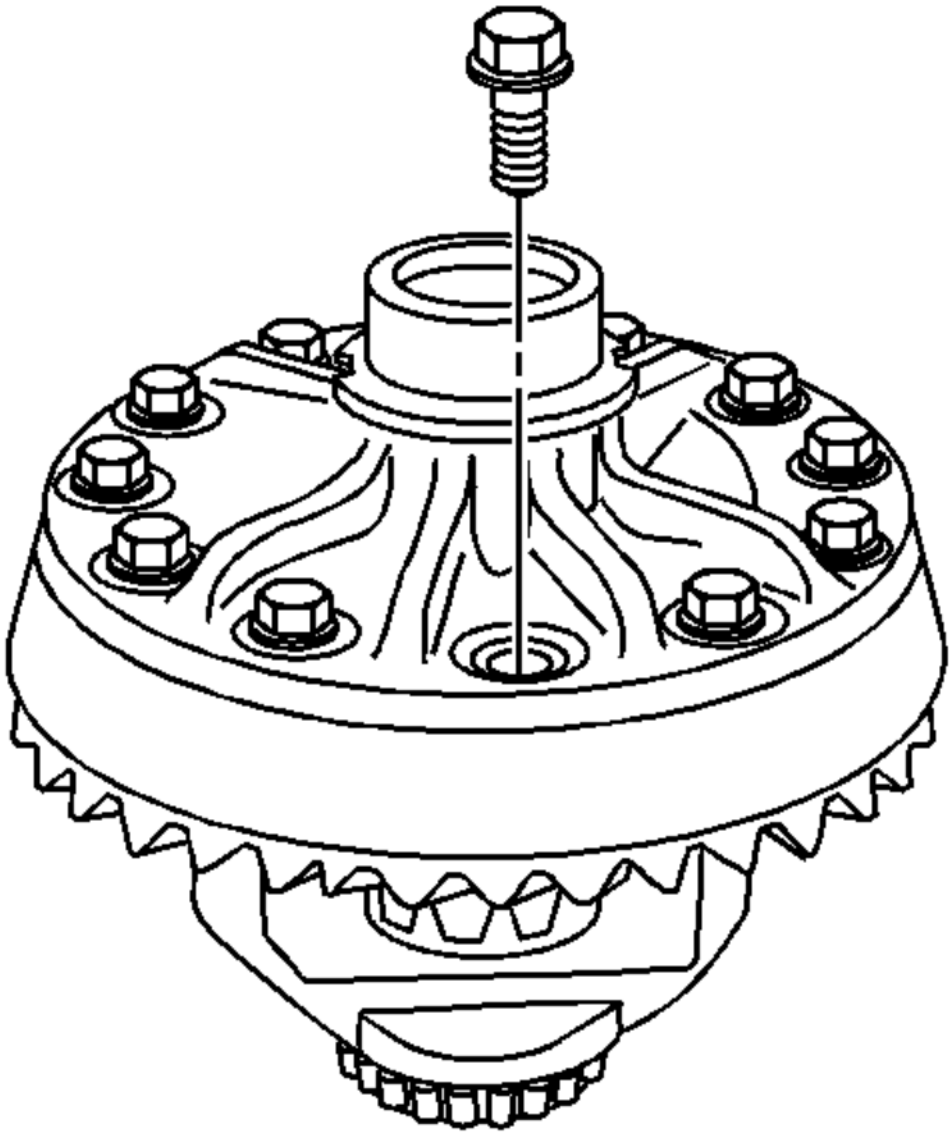


Fig. 240: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts have left-hand threads.

2. Remove the gear bolts. Discard the bolts.

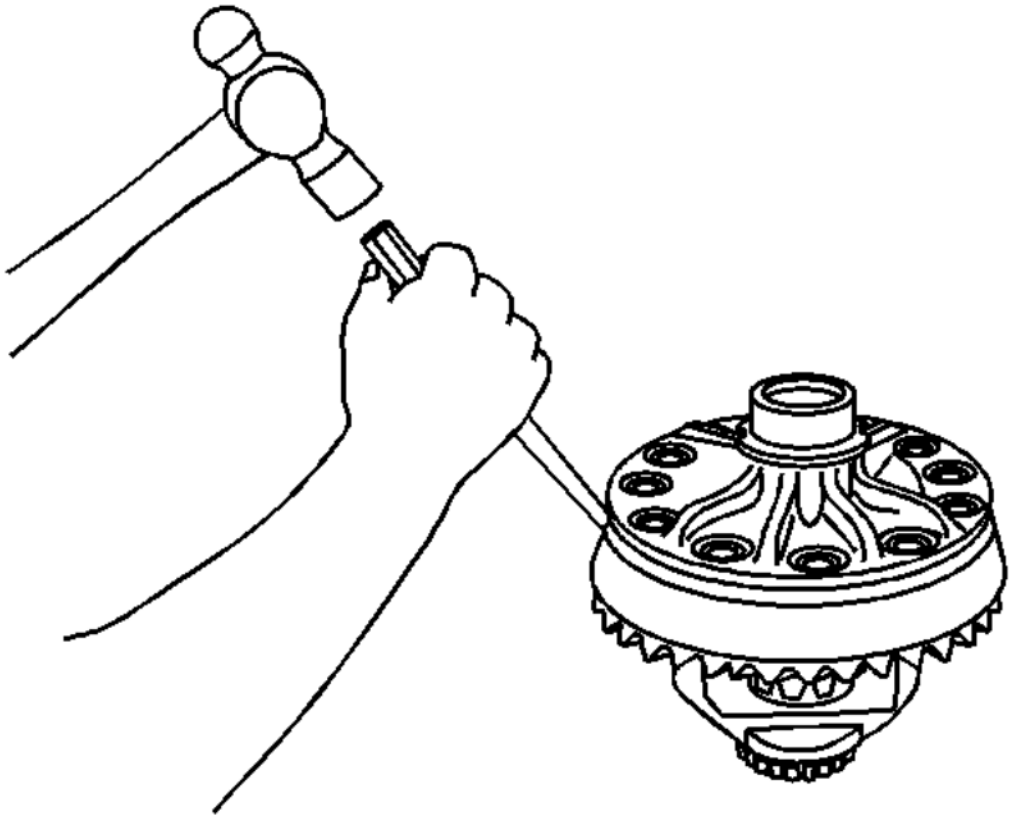


Fig. 241: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Ring Gear Removal Notice .

3. Remove the ring gear from the differential case.

   Drive the ring gear off with a brass drift if necessary.

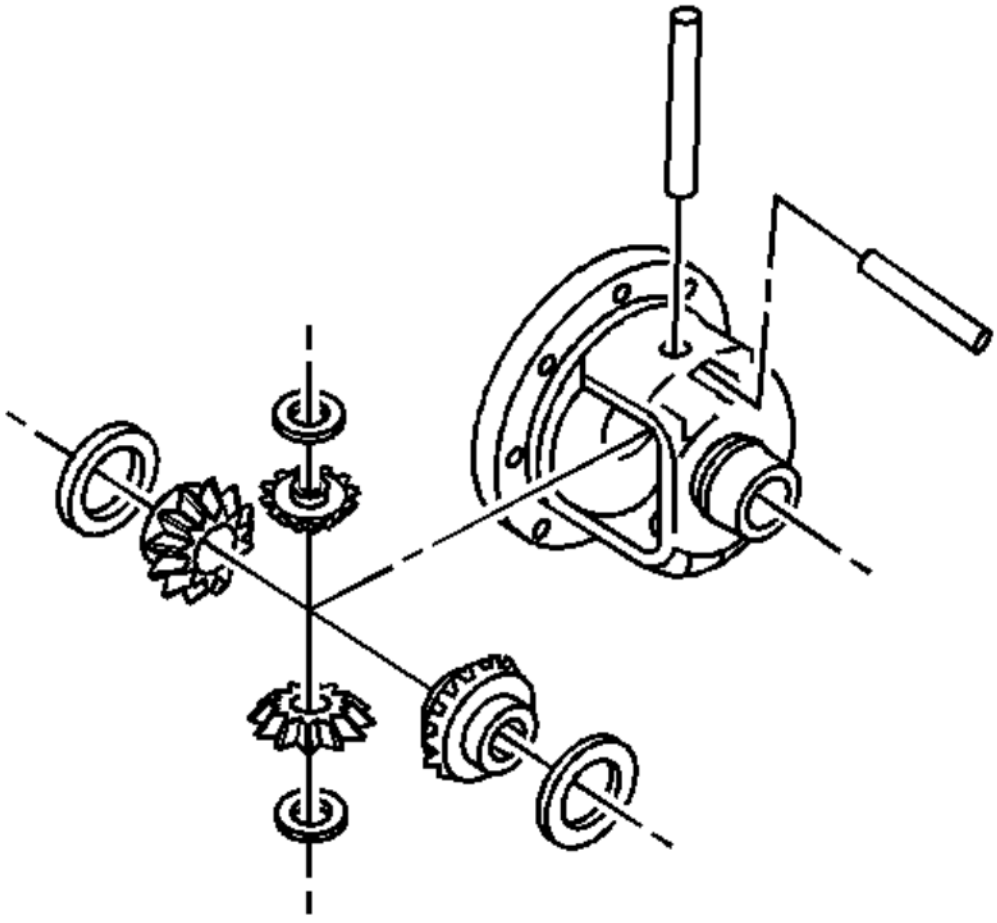


Fig. 242: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

4. Remove the differential pinion gears and the differential side gears by performing the following steps:
    1. Remove the pinion shaft lock bolt.
    2. Remove the pinion shaft.
    3. Roll the differential pinion gears out of the case with the pinion gear thrust washers.
    4. Remove the differential side gears and the side gear thrust washers.

    Mark the pinion gears top and bottom and the differential side gears left and right.

Assembly Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
2. Install the differential side gear thrust washers to the differential side gears.
3. Install the differential side gears and thrust washers into the differential case.

   If the same differential side gears and the thrust washers are being used, install the gears and the thrust washers to their original locations.

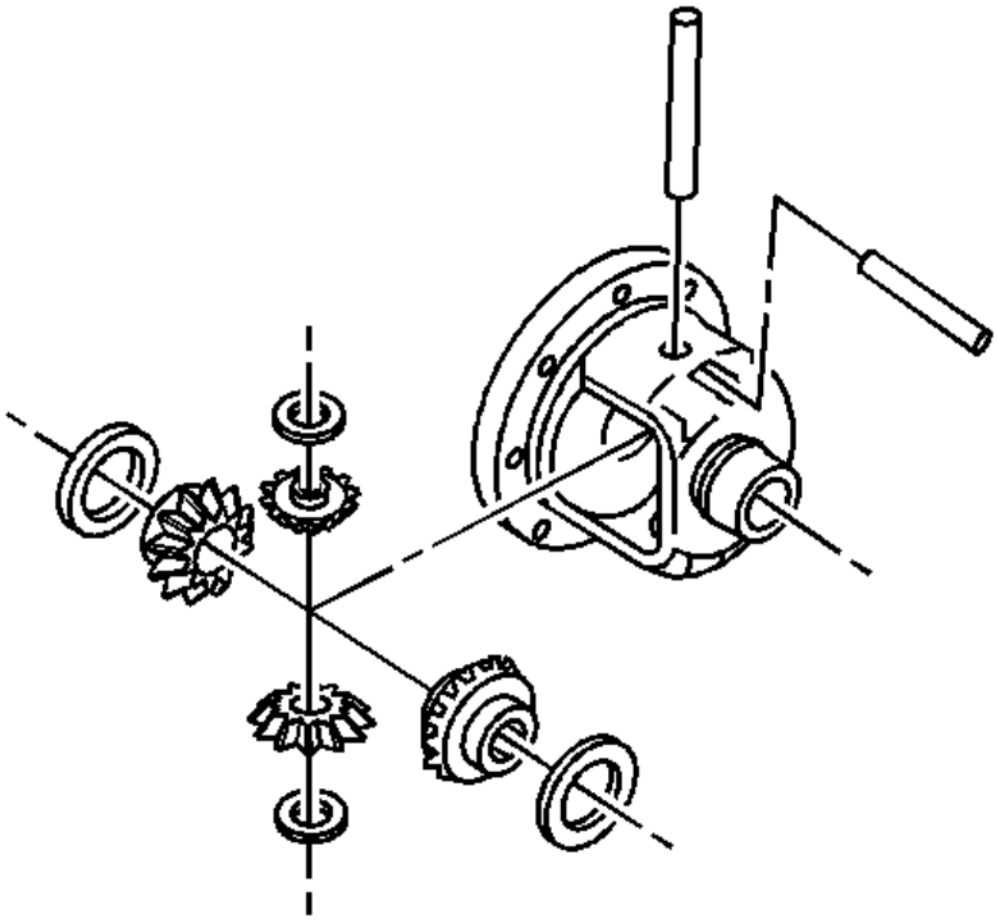


Fig. 243: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

4. Install the differential pinion gears and pinion gear thrust washers by performing the following steps:
   1. Position one pinion gear between the differential side gears.
   2. Position the second pinion gear between the differential side gears directly opposite the of the first gear.
   3. Rotate the differential side gears until the pinion gears is directly opposite the opening in the differential case.
   4. Install the thrust washers.

      Rotate the pinion gears toward the differential opening in order to permit the sliding in of the thrust washers.

5. Install the pinion shaft.

   NOTE: Refer to Fastener Notice .

6. Install a new pinion shaft lock bolt.

   Tighten: Tighten the new pinion shaft lock bolt to 36 N.m (27 lb ft).

   IMPORTANT: The mating surface of the ring gear and the differential case must be clean and free of burrs before installing the ring gear.

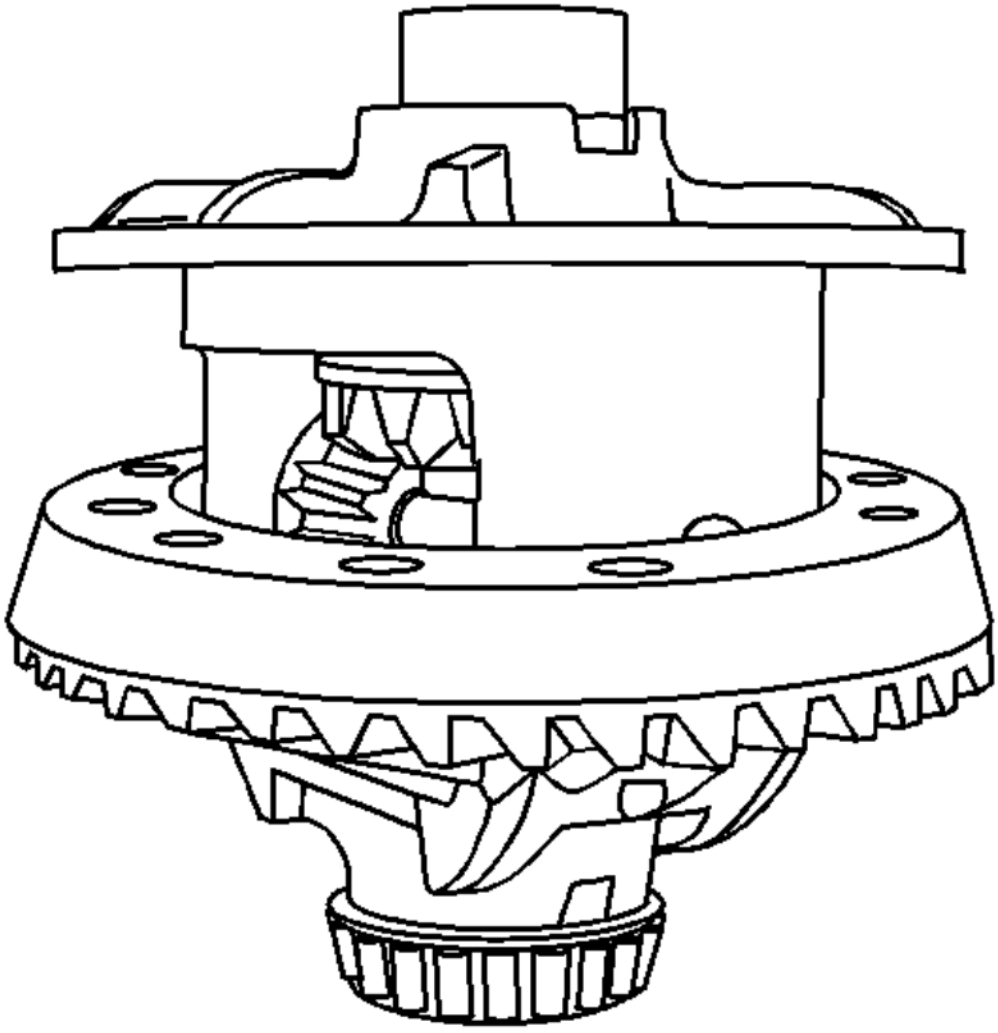


Fig. 244: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

7. Install the ring gear to the differential case.

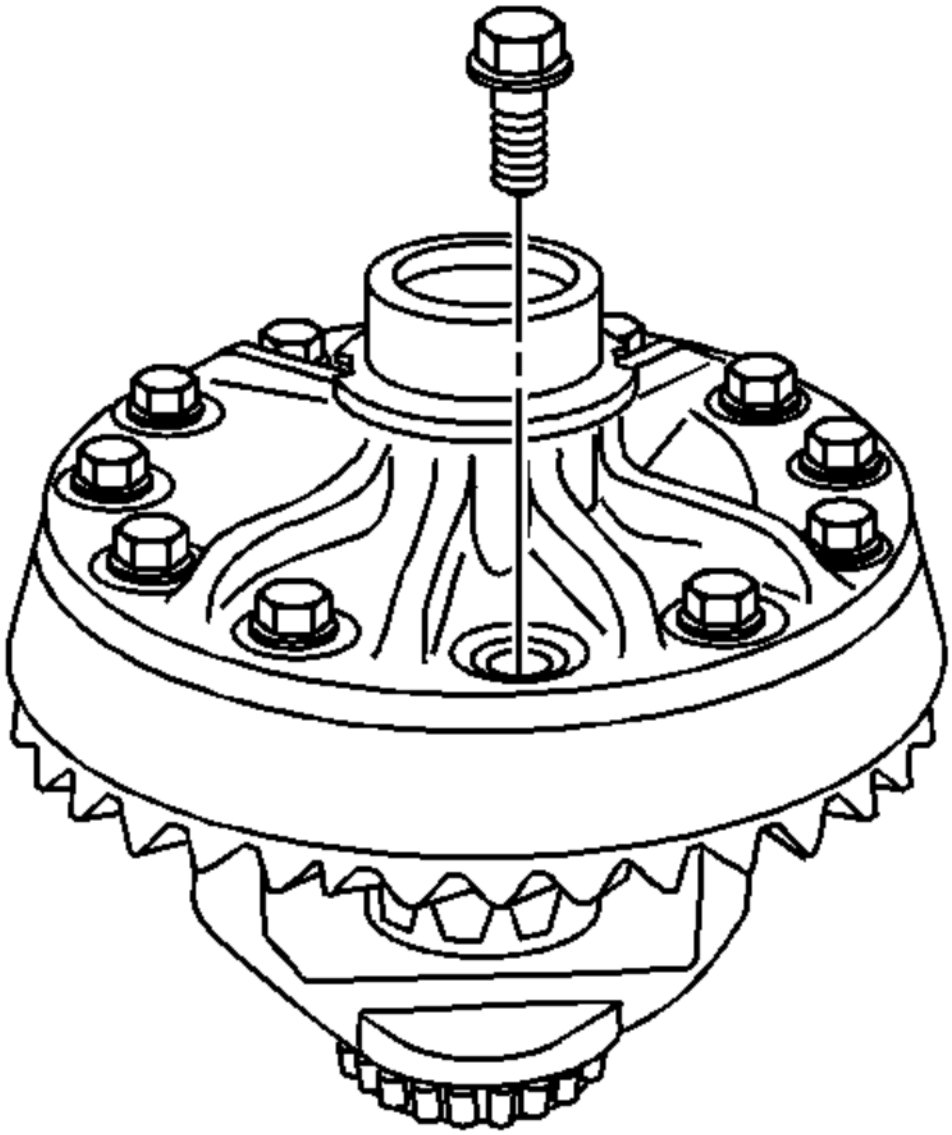


Fig. 245: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts have left - hand threads.

8. Install the new ring gear bolts.

Hand start each bolt to ensure that the ring gear is properly installed to the differential case.

9. Tighten the ring gear bolts. Tighten the bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

   Tighten: Tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).

10. Install the differential side bearings. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)**.

DIFFERENTIAL OVERHAUL (10.5 INCH AXLE)

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 22888-D** Side Bearing Remover Kit
- **J 29710** Differential Side Bearing Installer

Disassembly Procedure

1. Remove the differential side bearings by performing the following steps:
   1. Place a block of wood on each side of the differential case before installing the differential case into the vise.

      Install the differential assembly into a vise.

   2. Install the **J 8107-3** and the **J 22888-20A** onto the differential side bearing. See **Special Tools**.
   3. Remove the differential side bearings using the **J 22888-20A** . See **Special Tools**.

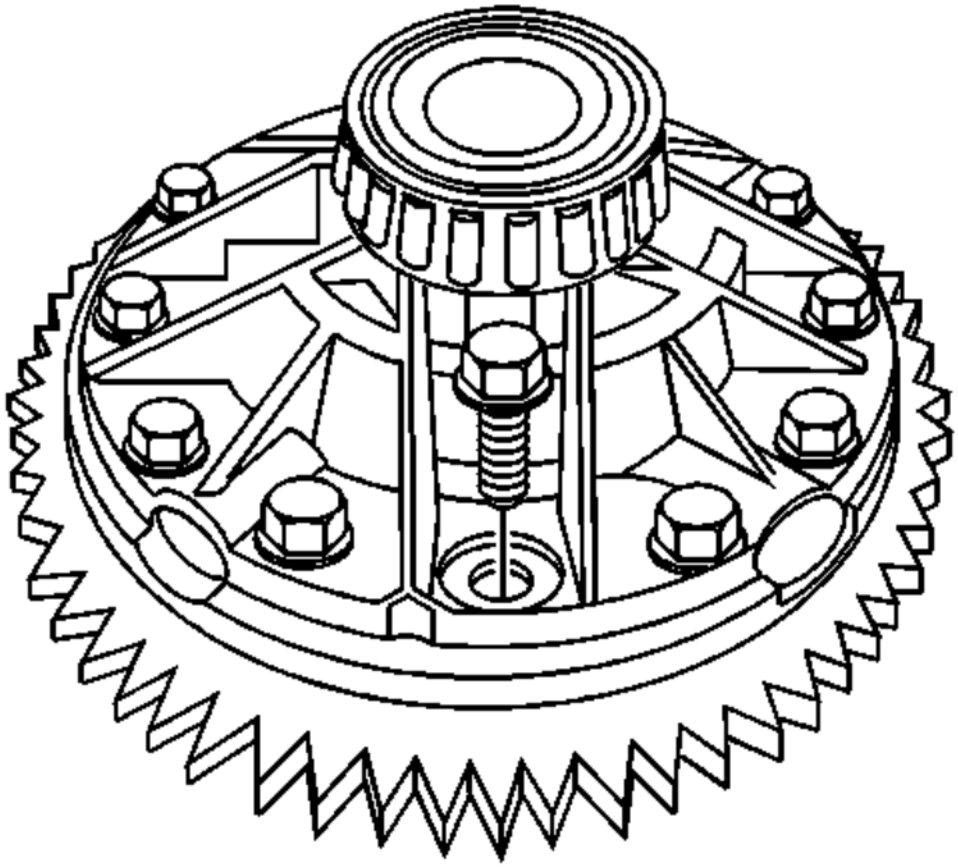


Fig. 246: Ring Gear Bolts (10.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

2. Remove the ring gear bolts.

NOTE: Refer to Ring Gear Removal Notice .

3. Remove the ring gear from the differential case.

   Drive the ring gear off with a brass drift if necessary.

4. Separate the differential case assembly.

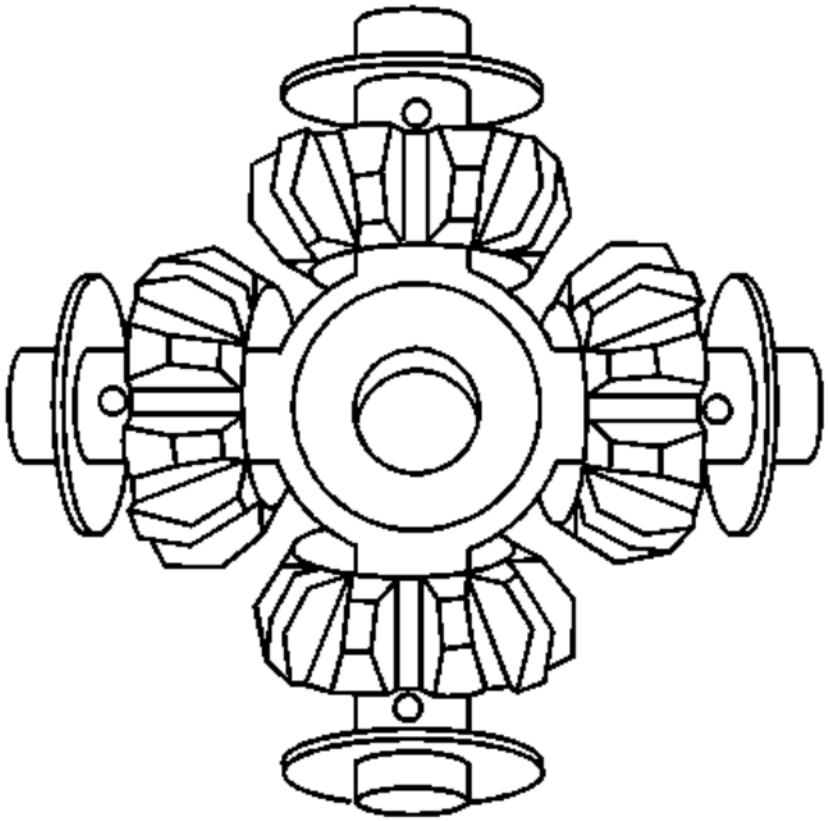


Fig. 247: Differential Pinion Gears
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the differential pinion gears, the differential side and the thrust washers are to be reused, mark the components so they can be re-installed in their original location in the differential case.

5. Remove the following from the differential case:
   - The thrust washers
   - The differential pinion gears
   - The differential pinion spider

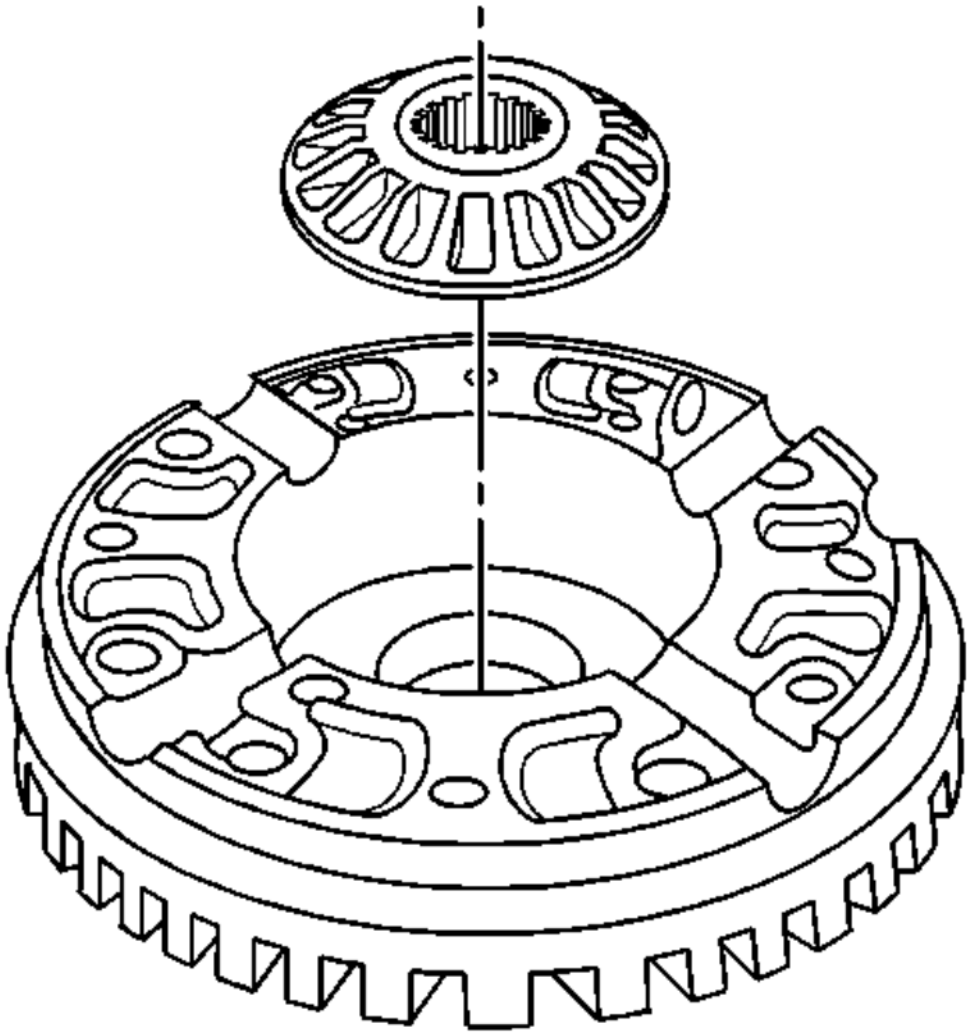


Fig. 248: Differential Side Gears
Courtesy of GENERAL MOTORS CORP.

6. Remove the differential side gears.

Assembly Procedure

1. Lubricate the differential side gears and the differential pinion gears with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

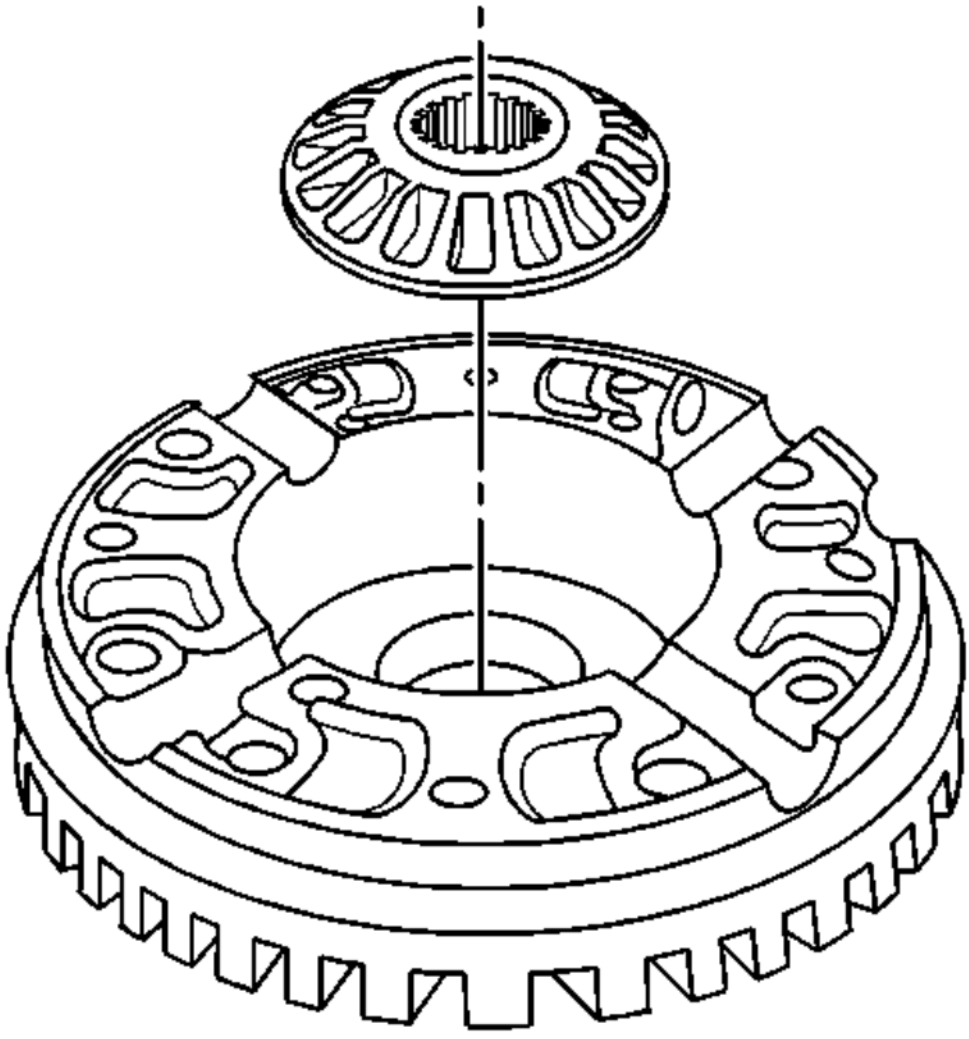


Fig. 249: Differential Side Gears
Courtesy of GENERAL MOTORS CORP.

2. Install the differential side gears into the differential case.

   If the original differential side gears are being used, install the gears in the original location.

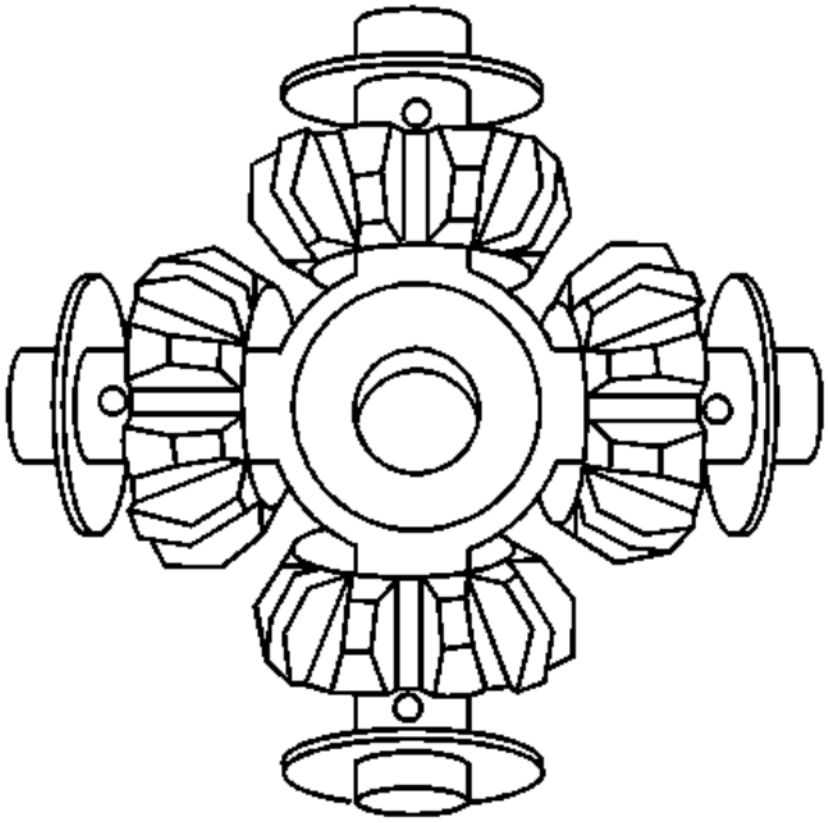


Fig. 250: Differential Pinion Gears
Courtesy of GENERAL MOTORS CORP.

3. Assemble the differential pinion gears and the thrust washers to the differential spider as shown.

   If the original differential pinion gears, the thrust washers and the differential spider are being used, install the components in the original locations.

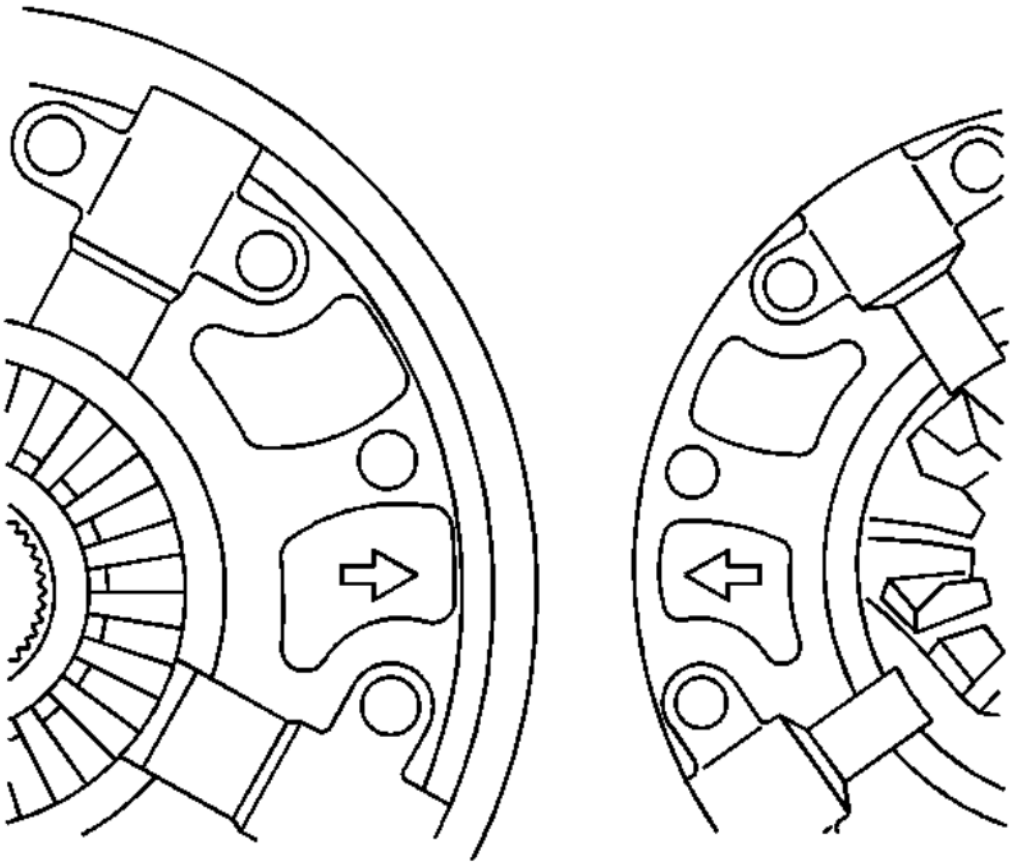


Fig. 251: Aligning Differential Case Arrows
Courtesy of GENERAL MOTORS CORP.

4. Assemble the differential case halves.

   Align the arrow in the differential case as shown.

   IMPORTANT: The mating surface of the ring gear and the differential case must be clean and free of burrs before installing the ring gear.

5. Install the ring gear to the differential case.

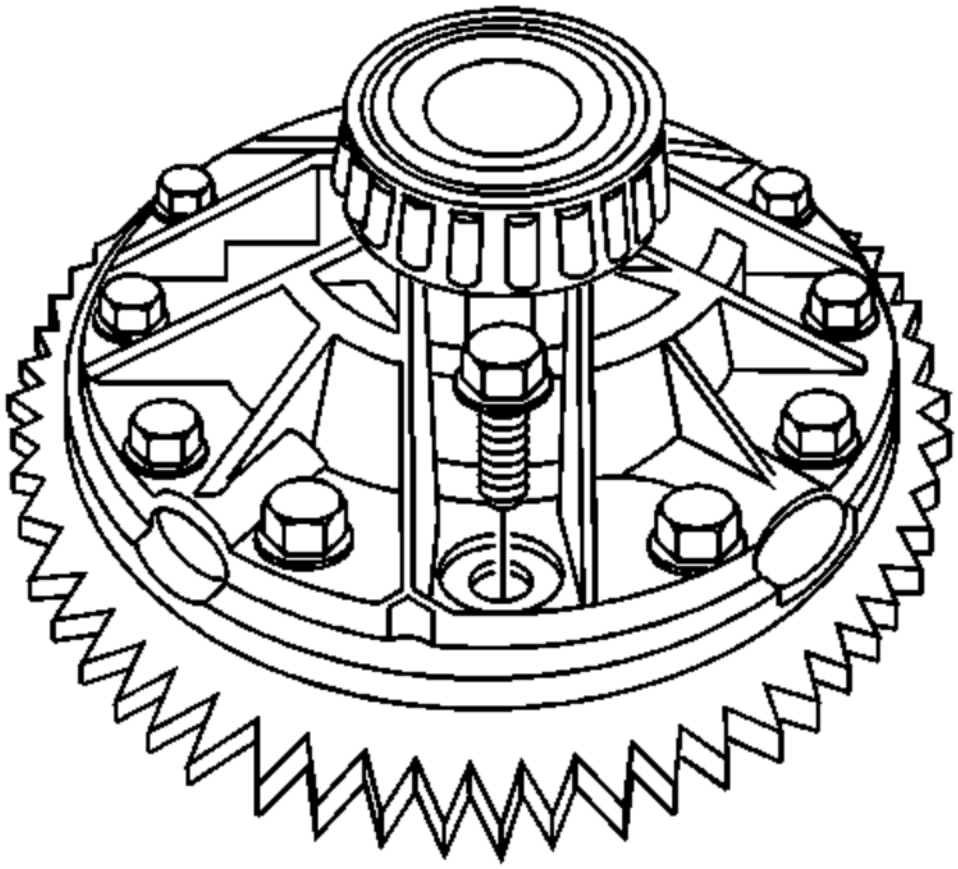


Fig. 252: Ring Gear Bolts (10.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

6. Install the new ring gear bolts.

   Hand start each bolt to ensure that the ring gear is properly installed to the differential case.

7. Tighten the ring gear bolts. Tighten the bolts alternately and in stages, gradually pulling the ring gear onto the differential case.

   Tighten: Tighten the ring gear bolts in sequence to 165 N.m (122 lb ft).

8. Install the differential side bearings by performing the following steps:
    1. In order to protect the differential case, install the **J 8107-3** in the case on the side opposite the bearing installation. See **Special Tools**.
    2. Install the **J 29710** and the **J 8092** onto the differential case bearing.
    3. Drive the bearing onto the case using the **J 29710** and the **J 8092** .

BEARINGS INSPECTION

Carefully and thoroughly inspect all drive unit parts before assembly. Thorough inspection of the drive parts for wear or stress with subsequent replacement of worn parts eliminates costly drive component repair after assembly.

IMPORTANT: The differential bearings and the bearing cups are matched sets. Replace both the bearing and the cup when either part requires replacement.

- Lubricate the bearings with axle lubricant. Inspect the bearings for smooth rotation.
- Inspect the bearing rollers for wear.
- Inspect the bearing cups for wear, cracks, brinelling, and scoring.

DIFFERENTIAL INSPECTION

- Check the pinion gear shaft for unusual wear.
- Check the pinion and the side gear teeth for wear, cracks, scoring and spalling.
- Check the thrust washers for wear.
- Check the fit of the side gears in the differential case and on the axle shafts.
- Check the differential case for cracks and scoring and replace all of the worn parts as necessary.

PINION AND RING GEAR INSPECTION

Ring and pinion gears are matched sets. When replacement of one or the other is necessary, both the ring and pinion gear must be replaced.

- Check the pinion and ring gear teeth for cracking, chipping, scoring, or excessive wear.
- Check the pinion gear splines for wear.
- Check the pinion flange/yoke splines for wear.
- Check the fit of the pinion gear splines on the pinion flange/yoke.

- Check the sealing surface of the pinion flange/yoke for nicks, burrs or rough tool marks that could damage the seal and cause an oil leak.
- Check for worn or broken parts and replace as necessary.

REAR AXLE HOUSING INSPECTION

Carefully and thoroughly inspect all drive unit parts before assembly. Thorough inspection of the drive parts for wear or stress with subsequent replacement of worn parts eliminates costly drive component repair after assembly.

- Inspect for nicks or burrs that could prevent the outer diameter of the pinion seal from sealing. Remove any burrs.
- Inspect the bearing cup bores for nicks or burrs. Remove any burrs that are found.
- Inspect the housing for cracks. Replace the housing if any cracks are found.
- Inspect the housing for foreign material such as metal chips, dirt, or rust.

SHIMS INSPECTION

IMPORTANT:

- **Do not reinstall the original cast iron production shims, if removed. Once the cast iron shims are removed from the axle housing, they must be replaced with service shims and spacers.**
- **If service shims were previously installed, the shims can be reused.**

Inspect the shims for cracks and chips. Replace the damaged shims.

PINION DEPTH ADJUSTMENT (10.5 INCH AXLE)

1. Install the differential, if necessary. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)**.

   IMPORTANT: Measure and record the thickness of the pinion gear bearing retainer shim before any service procedures are performed to the pinion gear bearing retainer assembly.

2. Install the original shim to the pinion bearing retainer. If the original shim is not available, install a 0.41 mm (0.016 in) shim to build pinion depth.

IMPORTANT: Do not apply sealant to the pinion gear bearing retainer at this time.

3. Install the pinion gear bearing retainer.

   NOTE: Refer to Fastener Notice .

4. Install the pinion gear bearing retainer bolts.

   Tighten: Tighten the pinion gear bearing retainer bolts to 88 N.m (65 lb ft).

5. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
6. Perform a gear tooth pattern check on the pinion and the ring gear. Refer to **Gear Tooth Contact Pattern Inspection**.
7. If the gear tooth contact pattern indicates a high or a low flank contact pattern, adjust the pinion depth by doing the following:
   1. Remove the pinion gear bearing retainer bolts.
   2. Remove the pinion gear bearing retainer.
   3. Remove the shim.
      - If the gear tooth contact pattern shows a high flank contact pattern, install a shim one size larger.
      - If the gear tooth contact pattern shows a low flank contact pattern, install a shim one size smaller.
   4. Install the new shim to the pinion gear bearing retainer.
   5. Install pinion gear bearing retainer.
   6. Install pinion gear bearing retainer bolts.

      Tighten: Tighten the pinion gear bearing retainer bolts to 88 N.m (65 lb ft).

   7. Inspect the gear tooth contact pattern of the pinion and the ring gear. Refer to **Gear Tooth Contact Pattern Inspection** .
   8. If the gear tooth pattern is still incorrect, adjust the shim thickness as necessary and recheck the gear tooth pattern of the pinion and the ring gear.
8. Inspect the backlash between the pinion and the ring gear and adjust, if necessary. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.

The pinion shims are available in the following sizes:

Shim Sizes

- 0.15 mm (0.006 in)
- 0.18 mm (0.007 in)
- 0.20 mm (0.008 in)
- 0.23 mm (0.009 in)
- 0.25 mm (0.010 in)
- 0.28 mm (0.011 in)
- 0.30 mm (0.012 in)
- 0.33 mm (0.013 in)
- 0.36 mm (0.014 in)
- 0.38 mm (0.015 in)
- 0.41 mm (0.016 in)
- 0.43 mm (0.017 in)
- 0.46 mm (0.018 in)
- 0.48 mm (0.019 in)
- 0.51 mm (0.020 in)
- 0.53 mm (0.021 in)
- 0.56 mm (0.022 in)
- 0.58 mm (0.023 in)
- 0.61 mm (0.024 in)

PINION DEPTH ADJUSTMENT (8.6, 9.5/9.5LD, AND 11.5 INCH AXLES)

Tools Required

- **J 45108** Pinion Setting Gage Block (9. See **Special Tools**.5/9.5LD inch Axle)
- **J 21777-86** Side Bearing Disc (9. See **Special Tools**.5/9.5LD inch Axle, 2 Required)
- **J 34925** Pinion Setting Gage Kit. See **Special Tools**.
- **J 44416** Pinion Setting Adapter Kit (11. See **Special Tools**.5 inch axle)
- **J 8001** Dial Indicator Set

Adjustment

IMPORTANT: Make sure all of the tools, the differential side bearing bores, and the pinion bearing cups are clean before proceeding.

1. Lubricate the pinion bearings with axle lubricant. Refer to **Fluid and Lubricant Recommendations** .
2. Install the pinion bearings into the axle housing.

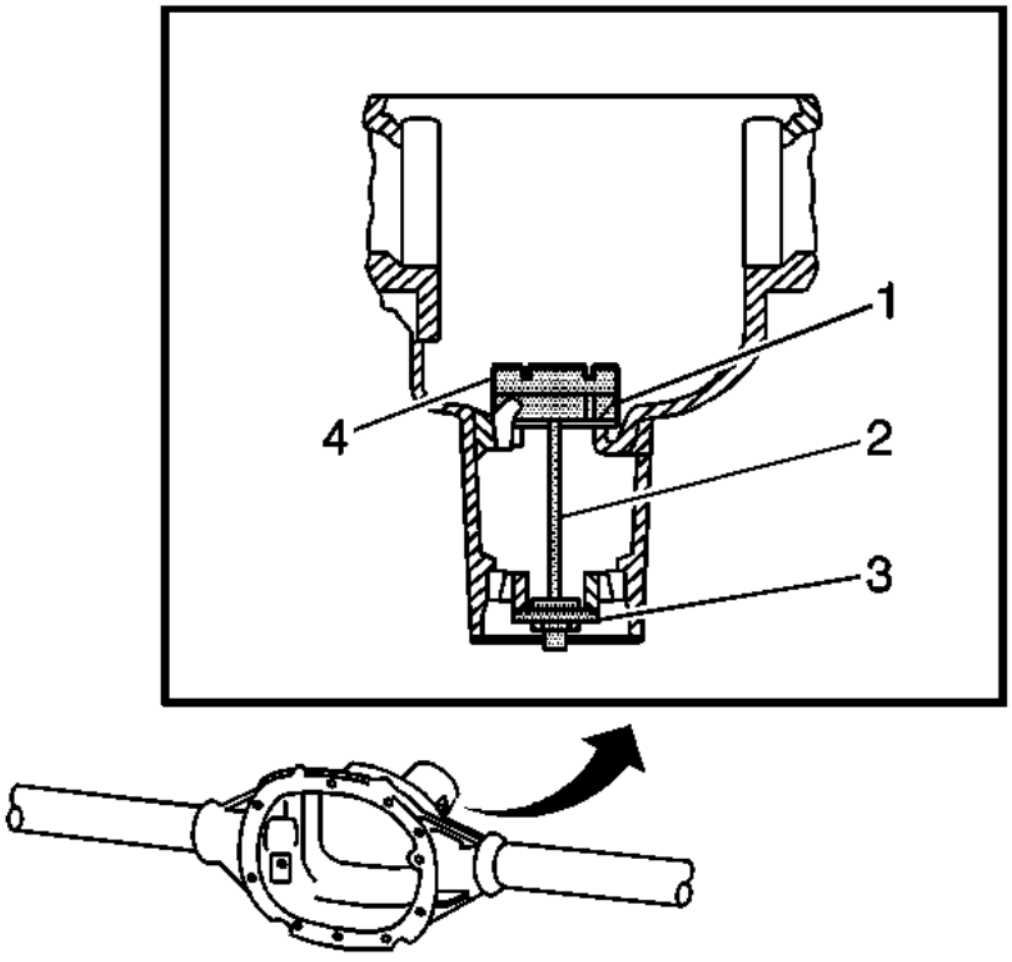


Fig. 253: Assembling Special Tools In Axle Housing
Courtesy of GENERAL MOTORS CORP.

3. Assemble the following components into the axle housing:

- For the 8.6 inch axle, assemble the J 21777-35 (1), the J 21777-43 (2), the J 21777-42 (3), and the J 21777-29 (4) as shown.
- For the 9.5/9.5LD inch axles, assemble the J 21777-8 (1), the J 21777-43 (2), the J 21777-42 (3), and the **J 45108** (4) as shown. See **Special Tools**.
- For the 11.5 inch axle, assemble the J 44416-3 (1,4), the J 21777-43 (2), and the J 44416-2 (3) as shown.

4. While holding the J 21777-43 stationary, install an inch-pound torque wrench on the nut of the J 21777-43 and tighten the nut until a rotating torque of 1.7 N.m (15 lb in) is obtained.

   Rotate the assembly several times in both directions in order to seat the pinion bearings.

5. Check the rotating torque of the assembly. If the torque is less than 1.7 N.m (15 lb in), tighten the nut on the J 21777-43 until a rotating torque of 1.7-2.3 N.m (15-20 lb in) is obtained.

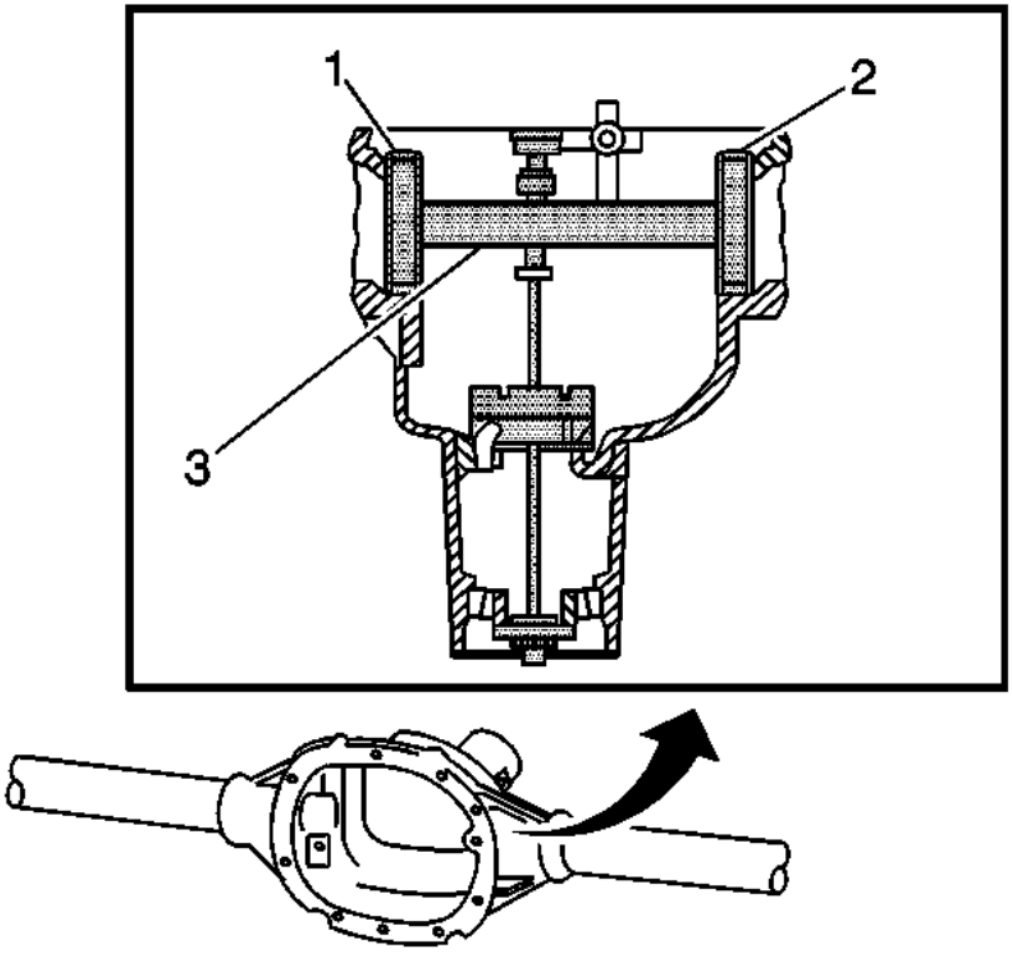


Fig. 254: Assembling Special Tools In Differential Carrier Bore
Courtesy of GENERAL MOTORS CORP.

6. Assemble the following components into the differential carrier bore of the axle housing:
   - For the 8.6 inch axle, assemble the J 21777-45 (1, 2) to the J 21777-1 (3) as shown.
   - For the 9.5/9.5LD inch axles, assemble the J 21777-86 (1, 2) to the J 21777-1 (3) as shown.
   - For the 11.5 inch axle, assemble the J 44416-1 (1, 2) to the J 21777-1 (3) as shown.
7. Install the bearing caps.

NOTE: Refer to Fastener Notice .

8. Install the bearing cap bolts.

   Tighten: Tighten the bearing cap bolts to 75 N.m (55 lb ft).

9. Rotate the J 21777-1 within the J 21777-45, 8.6 inch axle, or the J 21777-86, 9.5/9.5LD inch axles, or the J 44416-1, 11.5 inch axle. The J 21777-1 must rotate back and forth freely within the discs. If the J 21777-1 does not rotate freely, disassemble the components, inspect for proper seating and/or mis-aligned components and re-assemble.

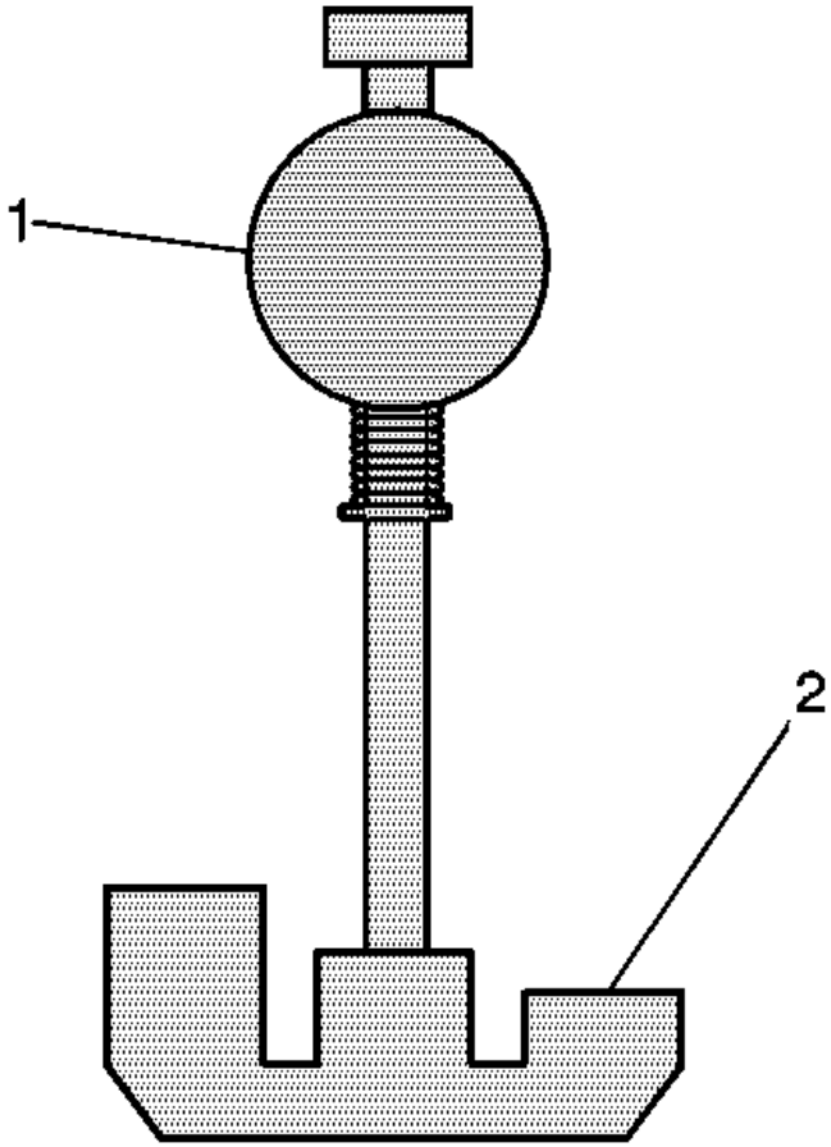


Fig. 255: J 21777-1 & J 44416-3
Courtesy of GENERAL MOTORS CORP.

10. Align the plunger of the J 21777-1 (1) to the 8.5 inch gage block setting of the J 21777-29, 8.6 inch axle, or the **J 45108** , 9. See **Special Tools**.5/9.5LD inch axles, or the J 44416-3, 11.5 inch axle (2).

11. Install the **J 8001** to the J 21777-1 as follows:
    1. Loosely clamp the **J 8001** onto the stem on the J 21777-1.
    2. Place the contact pad of the **J 8001** onto the mounting post of the J 21777-1.
    3. With the contact pad of the **J 8001** touching the mounting post of the J 21777-1, loosen the lock nut on the **J 8001** and push down on the **J 8001** until the needle the **J 8001** has turned 3/4 of a turn clockwise.
    4. Tighten the clamp on the **J 8001** finger tight.
12. Move the plunger of the J 21777-1 back and forth until the needle of the **J 8001** indicates the greatest deflection.

    The deflection is the point where the needle changes direction.

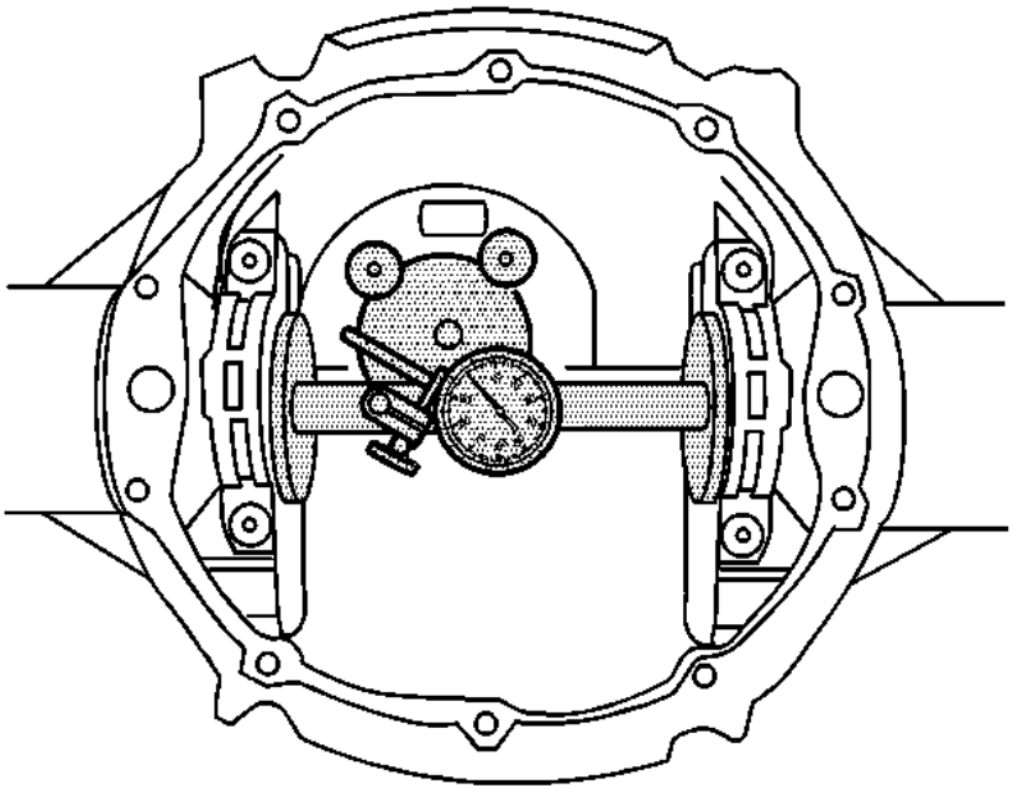


Fig. 256: Measuring Necessary Shim Thickness
Courtesy of GENERAL MOTORS CORP.

13. At the greatest point of deflection, move the housing of the **J 8001** until the needle indicates zero.
14. Move the plunger of the J 21777-1 back and forth again to verify the zero setting. Adjust the housing of the **J 8001** as necessary to set the needle to zero.
15. Rotate the plunger of the J 21777-1 away from the J 21777-29, 8.6 inch axle, the **J 45108** , 9. See **Special Tools**.5/9.5LD inch axles, or the J 44416-3, 11.5 inch axle, until it no longer touches the J 21777-29, the **J 45108** , or the J 44416-3. See **Special Tools**.
16. The value indicated on the **J 8001** is the thickness of the shim needed in order to set the depth of the pinion.
17. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
18. Remove the pinion depth setting tools.
19. Remove the pinion bearings.
20. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.

DIFFERENTIAL CARRIER BEARING PRELOAD ADJUSTMENT (10.5 INCH, 11.5 INCH AXLES AXLES)

Tools Required

J 24429 Side Bearing Backlash Spanner. See **Special Tools**.

Adjustment

IMPORTANT:

- **The differential side bearing preload is adjusted by the 2 adjusting nuts in the bearing bore. The bore and the bearing cap provide the mating threads for the bearing nut.**
- **The differential must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.**
- **The rotating torque of the drive pinion must be within specifications before the pinion gear bearing retainer can be installed.**

1. Install the pinion gear bearing retainer (10.5 in axle) or the drive pinion. Refer to **Drive Pinion Housing and/or Seal Replacement**.

IMPORTANT: The rotating torque of the drive pinion must be within specifications before installing the differential case assembly.

2. Install the drive pinion (11.5 in axle). Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
3. Install the differential side bearings, if necessary. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)**.
4. Install the differential side bearing adjuster nuts.

IMPORTANT: Before installation of the differential case assembly, ensure that the side bearing surfaces in the carrier are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.

5. Install the differential case assembly.

   If the differential case assembly cannot be installed, turn the differential side bearing adjuster nuts into the axle housing until the differential case assembly can be installed.

6. Install the differential bearing caps.
7. Install the differential bearing cap bolts.

   Tighten the bearing cap bolt finger-tight. Do not torque the bearing cap bolts at this time.

IMPORTANT: Do not force the ring gear into contact with the drive pinion.

8. Slide the differential case assembly towards the right side axle housing until the ring gear contact the pinion.

   This is the zero backlash point.

   If the zero backlash cannot be obtained, turn the right side differential bearing adjuster nut in towards the axle housing until the ring gear fully contacts the pinion to obtain the zero backlash.

9. While holding the ring gear against the pinion, turn the left differential bearing adjuster nut out from the axle housing using the **J 24429** until it contacts the differential side bearing.

See **Special Tools**.

10. Turn the right differential bearing adjuster nut out from the axle housing using the **J 24429** until it contacts the differential side bearing. See **Special Tools**.
11. Back off the left adjusting nut approximately 2 slots using the **J 24429** in order to obtain the initial backlash adjustment. See **Special Tools**.
12. Install the left adjuster nut lock and the adjuster nut lock bolt.

    Do not torque the bolt at this time.

13. Firmly tighten the right differential bearing adjuster nut using the **J 24429** in order to force the differential case assembly into solid contact with the left differential adjuster nut. See **Special Tools**.
14. Rotate the pinion several times in order to seat the bearings.
15. Loosen the right differential bearing adjuster nut using the **J 24429** until the nut is free from the differential side bearing. See **Special Tools**.
16. Tighten the right differential bearing adjuster nut using the **J 24429** until the differential bearing adjuster nut contacts the bearing. See **Special Tools**.
17. Once the right differential bearing adjuster contacts the differential bearing, tighten the differential bearing adjuster nut using the **J 24429** the following additional amounts:. See **Special Tools**.

    Tighten:

    - For used bearings, tighten the differential bearing adjuster nut an additional 2 slots.
    - For new bearings, tighten the differential bearing adjuster nut an additional 3 slots.

18. Install the right differential bearing adjuster nut lock.
19. Install the right differential bearing adjuster nut lock bolt.

    Do not torque the bolt at this time.

NOTE: Refer to Fastener Notice .

20. Tighten the bearing cap bolts.

    Tighten:

    - For the 10.5 in axle, tighten the bearing cap bolts to 185 N.m (136 lb ft).
    - For the 11.5 in axle, tighten the bearing cap bolts to 207 N.m (153 lb ft).

21. Tighten differential bearing adjuster nut lock bolts.

    Tighten: Tighten the differential bearing adjuster nut lock bolts to 27 N.m (20 lb ft).

22. Measure the ring gear to pinion backlash and adjust, if necessary. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.

DIFFERENTIAL CARRIER BEARING PRELOAD ADJUSTMENT (8.6 INCH AXLE)

Wedge Method

Tools Required

- **J 22779** Side Bearing Backlash Gage. See **Special Tools**.
- **J 25588** Side Bearing Shim Installer. See **Special Tools**.

Adjustment

IMPORTANT:

- **The differential side bearing preload adjustment must be completed before the backlash adjustment can be started.**
- **In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.**
- **Measure the service shims and the spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.**
- **Do not use or reuse the original cast iron production shims. Use service shims and spacers instead.**

1. Install the drive pinion, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
2. Measure the rotating torque of the drive pinion using an inch-pound torque wrench. Record the measurement.

   Specification: The rotating torque of the drive pinion should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m (10-20 lb in) for used bearings.

3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

IMPORTANT: Before installation of the differential assembly, ensure that the differential side bearing surfaces in the axle housing are clean and free of burrs. If the original differential side bearings are to be reused, the original differential side bearing cups must also be used.

4. Install the differential assembly with the differential side bearings and differential side bearing cups into the axle housing.
5. Insert one 4.318 mm (0.170 in) thick service spacer into the left side of the axle housing.
6. Side the differential assembly towards the service spacer in order to hold the spacer in place.
7. Install the **J 22779** into the right side of the axle housing. See **Special Tools**.

   The **J 22779** must be installed between the service spacer and the differential side bearing cup. See **Special Tools**.

IMPORTANT: Over-tightening of the J 22779 may spread the housing and result in incorrect shim selection. See Special Tools.

8. Tighten the knob on the **J 22779** until there is moderate drag when the **J 22779** is moved. See **Special Tools**.
9. Remove the **J 22779** . See **Special Tools**.
10. Remove the service spacer.
11. Using a micrometer, measure the thickness of the service spacer. Record the measurement.
12. Using a micrometer, measure the thickness of the **J 22779** in 3 locations. See **Special Tools**. Calculate the average of the 3 measurements. Record the measurement.
13. Add the thickness of the service spacer, measured in step 11 to the average thickness of the **J 22779** , measured in step 12. See **Special Tools**. The resulting value is the total service shim thickness without preload for the axle.
14. Insert one BENT 1.016 mm (0.040 in) service shim between the right side differential side bearing cup and the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
15. Install the **J 22779** into the left side of the axle housing. See **Special Tools**. The **J 22779**

must be installed between the service spacer and the differential side bearing cup. See **Special Tools**.

16. While rotating the ring gear back and forth, tighten the knob on the **J 22779** until there is approximately 0. See **Special Tools**.025-0.051 mm (0.001-0.002 in) of backlash between the ring gear and the drive pinion.
17. Once the correct amount of backlash is obtained, remove the **J 22779** . See **Special Tools**.
18. Remove the differential assembly with the differential side bearings and the differential side bearing cups.
19. Remove the BENT service shim.
20. Using a micrometer, measure the thickness of the **J 22779** in 3 locations. See **Special Tools**. Calculate the average of the 3 measurements. This value is the left side service shim thickness without preload.
21. In order to determine the right side service shim thickness, subtract the service shim thickness for the left side of the axle, calculated in step 20, from the total service shim thickness, calculated in step 13. This value is the service shim thickness for the right side of the axle without preload.
22. In order to preload of the differential side bearings and set the backlash to approximately 0.127-0.223 mm (0.005-0.009 in), take the value determined in step 21 and add 0.203 mm (0.008 in) service shim thickness to this amount.
23. Assemble the left side shim pack using one 4.318 mm (0.170 in) service spacer and the appropriate amount of service shims equaling the thickness determined in step 20. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.
24. Assemble the right side shim pack using one 4.318 mm (0.170 in) service spacer and the appropriate amount of service shims equaling the thickness determined in step 22. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.
25. Install the differential assembly with the differential side bearings and the differential side bearing cups.
26. Install the left side service spacer and service shim into the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
27. Install the right side service spacer between the axle housing and the differential side bearing cup.
28. Install the right side service shim into the axle housing using the **J 25588** , if necessary. See **Special Tools**. The service shim must be installed between the service spacer and the differential side bearing cup.

NOTE: **Refer to Fastener Notice .**

29. Install the differential bearing caps and the bolts.

    Tighten: Tighten the differential bearing cap bolts to 75 N.m (55 lb ft).

30. Rotate the pinion several times to ensure the drive pinion and differential side bearings have seated.
31. Measure the rotating torque of the drive pinion and differential side bearings using an inch-pound torque wrench. Record the measurement.

    Specification: 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.

32. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in step 2, from the drive pinion and differential case bearing preload, measured in step 31. Multiply the value obtained by the axle ratio.

    Specification: The differential side bearing preload should be 1.7-4.0 N.m (15-35 lb in).

33. If the differential side bearing preload is not within specifications, add or subtract shim thickness equally from each shim pack as necessary in order to increase/decrease the side bearing preload.
34. Once the differential side bearing preload is correct, measure the backlash and adjust, if necessary. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
35. Once the differential side bearing preload and backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

Shim Method

Tools Required

J 25588 Side Bearing Shim Installer. See **Special Tools**.

Adjsutment

IMPORTANT:

- **The differential side bearings must have preload before the backlash adjustment can be started.**

- **In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.**
- **Measure the service shims and the service spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.**
- **Do not use or reuse the original cast iron production shims. Use service shims and service spacers instead.**

1. Install the drive pinion, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
2. Measure the rotating torque of the drive pinion using an inch-pound torque wrench. Record the measurement.

   Specification: The rotating torque for the drive pinion bearings should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m (10-20 lb in) for used bearings.

3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

   IMPORTANT: Before installation of the case assembly, ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.

4. Install the differential assembly with the differential side bearings and bearing cups into the axle housing.
5. Insert one BENT 1.016 mm (0.040 in) thick service shim into the right side axle housing. Side the differential assembly towards the bent service shim in order to hold the shim in place.
6. While holding the differential assembly against the bent service shim, install one 4.318 mm (0.170 in) thick service spacer into the left side axle housing.
7. Move the differential assembly to the right until the ring gear contacts the drive pinion. Once the ring gear contacts the drive pinion, continue to move the ring gear towards the drive pinion to until all backlash is removed.
8. While holding the ring gear against the drive pinion, insert progressively larger service

shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.

9. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.
10. Install the service shim that was just measured back into the left side of the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
11. Remove the BENT shim from the right side of the axle housing.
12. Insert one 4.318 mm (0.170 in) thick service spacer into the right side axle housing.
13. Move the differential assembly towards the left side of the axle housing. While holding the differential assembly against the left side shim pack, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.
14. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Verify the thickness of the service shim. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.
15. In order to preload the differential side bearing and set the initial backlash to approximately 0.127 mm (0.005 in), adjust the thickness of left and right side shims by doing the following:
    1. Subtract 0.152 mm (0.006 in) from the measurement recorded for the left side shim in step 9. Record the measurement.
    2. Add 0.356 mm (0.014 in) to the measurement recorded for the right side shim in step 14.
16. Select the correct service shim thickness for each side corresponding to the measurements determined above. Using a micrometer, verify the thickness of the service shim. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim.
17. Install the left side service shim into the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
18. Move the differential assembly towards the left side of the axle housing.
19. Install the right side service shim into the axle housing using the **J 25588** , if necessary. See **Special Tools**. The service shim must be installed between the service spacer and the differential side bearing cup.

NOTE: Refer to Fastener Notice .

20. Install the differential bearing caps and bolts.

    Tighten: Tighten the differential bearing cap bolts to 75 N.m (55 lb ft).

21. Rotate the pinion several times to ensure the bearings have seated.
22. Measure the rotating torque of drive pinion and differential case side bearings using an inch-pound torque wrench.

    Specification: 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.

23. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in Step 2, from the drive pinion and the differential case bearing preload, measured in Step 23. Multiply the value obtained by the axle ratio.

    Specification: The differential side bearing preload should be 1.7-4.0 N.m (15-35 lb in).

24. If the differential side bearing preload is not within specifications, add or subtract shim thickness equally from each shim pack as necessary in order to increase/decrease the side bearing preload.
25. Once the differential side bearing preload is within specifications, measure the backlash between the ring gear and the drive pinion and adjust, if necessary. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.
26. Once backlash and differential side bearing preload is within specifications, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

DIFFERENTIAL CARRIER BEARING PRELOAD ADJUSTMENT (9.5, AND 9.5LD INCH AXLES AXLES)

Tools Required

- **J 22779** Side Bearing Backlash Gage. See **Special Tools**.
- **J 24429** Side Bearing Backlash Spanner. See **Special Tools**.

Adjustment

IMPORTANT:

- **Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be**

reused, the original bearing cups must also be used.

- **The drive pinion bearing preload must be within specifications before the differential side bearing preload adjustment can be performed.**
- **The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.**

CAUTION: To prevent personal injury and/or component damage, support the differential case when removing the case from the axle housing. If the case is not supported, the differential case could fall and cause personal injury or damage to the differential case.

1. Remove the differential assembly, if necessary.
2. Measure the rotating torque of the drive pinion bearing using an inch-pound torque wrench.

   Specification: The rotating torque of the drive pinion should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m (10-20 lb in) for used bearings.

3. If the rotating torque of the drive pinion is less than 1.7 N.m (15 lb in) for new bearings or 1.1 N.m (10 lb in) for used bearings, tighten the pinion in small increments until the specified rotating torque is obtained.
4. If the rotating torque of the drive pinion is greater than 3.4 N.m (30 lb in) for new bearings or 2.3 N.m (20 lb in) for used bearings, remove the drive pinion and replace the collapsible spacer and re-install the drive pinion. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
5. Install the differential assembly, if necessary.
6. Support the differential assembly in order to prevent the differential assembly from falling out of the axle housing.

IMPORTANT: Do not force the ring gear into contact with the drive pinion.

7. Slide the differential case assembly towards the right side axle housing until the ring gear contacts the drive pinion.

   This is the ZERO backlash point.

If the ZERO backlash cannot be obtained, turn the differential bearing adjuster nut into the axle housing using the **J 24429** until the ring gear fully contacts the drive pinion to obtain the ZERO backlash. See **Special Tools**.

8. While holding the ring gear against the pinion, turn the differential bearing adjuster nut out from the axle housing using the **J 24429** until it contacts the differential side bearing. See **Special Tools**.
9. Turn the adjuster nut out from the axle housing an additional 2 slots using the **J 24429** in order to obtain the initial backlash adjustment. See **Special Tools**.
10. Install the adjuster nut lock and the adjuster nut lock bolt.
11. Remove the left side differential bearing cap bolts.
12. Remove the left side differential bearing cap.

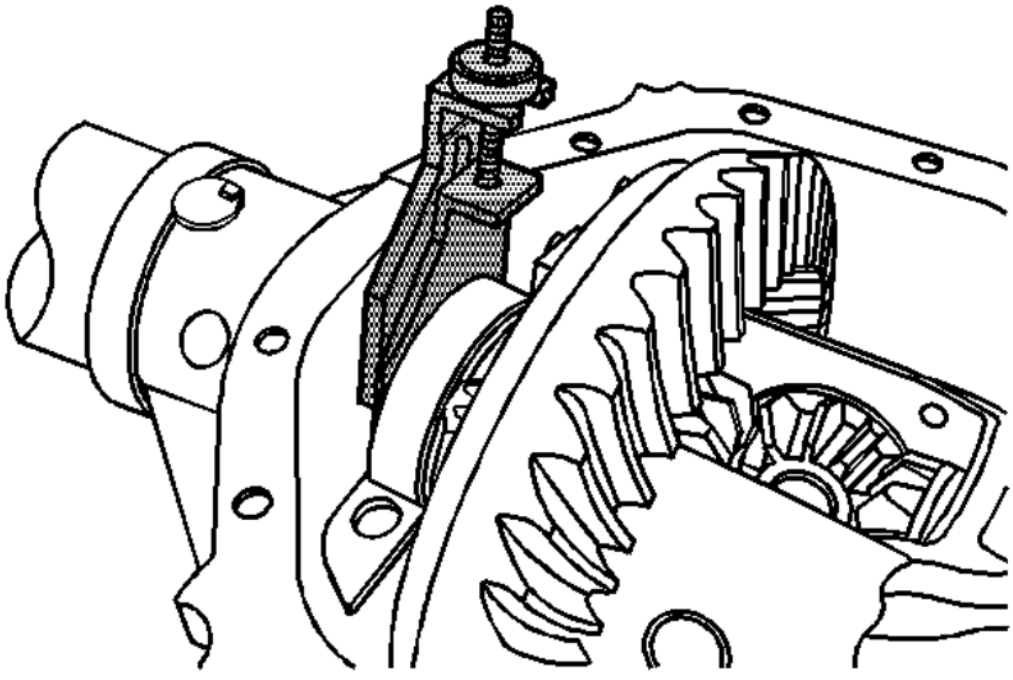


Fig. 257: J 22779
Courtesy of GENERAL MOTORS CORP.

13. Install the **J 22779** into the left side axle housing between the differential bearing bore and

the differential bearing cup. See **Special Tools**.

IMPORTANT: Over-tightening may spread the axle housing and result in incorrect shim selection.

14. Tighten the knob of the **J 22779** until there is moderate drag when the **J 22779** is moved. See **Special Tools**.
15. Remove the **J 22779** . See **Special Tools**.
16. Measure the **J 22779** in 3 locations. See **Special Tools**.
17. Calculate the average of the 3 measurements.

    The resulting value is the shim thickness required in order to set the initial backlash of the differential assembly.

18. Select a service shim of approximately the same thickness to install into the axle housing.

    Verify the thickness of the service shim using a micrometer.

19. Install the service shim into the axle housing between the differential bearing bore and the differential bearing cup.
20. Install the left side differential bearing cap.
21. Install the left side differential bearing cap bolts.

    Tighten the differential bearing cap bolts finger-tight. Do not torque the bolts at this time.

22. Remove the differential bearing adjuster nut lock bolt.
23. Remove the differential bearing adjuster nut lock.
24. Firmly tighten the differential bearing adjuster nut using the **J 24429** in order to force the differential case assembly into solid contact with the service shim. See **Special Tools**.
25. Rotate the pinion several times in order to seat the bearings.
26. Loosen the differential bearing adjuster nut using the **J 24429** until the nut is free from the differential side bearing. See **Special Tools**.
27. Tighten the differential bearing adjuster nut using the **J 24429** until the differential bearing adjuster nut contacts the bearing. See **Special Tools**.
28. Once the right differential bearing adjuster contacts the differential bearing, tighten the differential bearing adjuster nut using the **J 24429** the following additional amounts:. See **Special Tools**.

Tighten:

- For new bearings, tighten the differential bearing adjuster nut an additional 3 slots.
- For used bearings, tighten the differential bearing adjuster nut an additional 2 slots.

29. Install the right differential bearing adjuster nut lock.
30. Install the right differential bearing adjuster nut lock bolt.

    Do not torque the bolt at this time.

NOTE: Refer to Fastener Notice .

31. Tighten the bearing cap bolts.

    Tighten: Tighten the bearing cap bolts to 85 N.m (63 lb ft).

32. Tighten the differential bearing adjuster nut lock bolt.

    Tighten: Tighten the differential bearing adjuster nut lock bolt to 26 N.m(19 lb ft).

33. Measure the drive pinion and differential case side bearing preload using an inch-pound torque wrench.

    Rotate the pinion several times to ensure the bearings have seated.

    Specification: The rotating torque of the drive pinion and differential case bearings should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.

    Record the measurement.

34. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in Step 2, from the drive pinion and differential case bearing preload, measured in Step 33.

    Multiply the value obtained by the axle ratio.

    Specification: The differential case side bearing preload should be 1.7-4.0 N.m (15-35 lb in).

35. If the differential case side bearing preload is not within specifications, use the J 24429 and turn the differential side bearing adjuster nut in or out one slot at a time in order to

increase/decrease the side bearing preload.

36. Once the differential side bearing preload is correct, measure the drive pinion to differential assembly backlash and adjust, if necessary. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (10.5, 11.5 Inch Axles)** or **Backlash Adjustment (9.5 LD Axle)**.

Differential side bearing shims are available in the following sizes:

Shim Sizes:

- 5.59 mm (0.220 in)
- 5.64 mm (0.222 in)
- 5.69 mm (0.224 in)
- 5.74 mm (0.226 in)
- 5.79 mm (0.228 in)
- 5.84 mm (0.230 in)
- 5.89 mm (0.232 in)
- 5.94 mm (0.234 in)
- 5.99 mm (0.236 in)
- 6.05 mm (0.238 in)
- 6.10 mm (0.240 in)
- 6.15 mm (0.242 in)
- 6.20 mm (0.244 in)
- 6.25 mm (0.246 in)
- 6.30 mm (0.248 in)
- 6.35 mm (0.250 in)
- 6.40 mm (0.252 in)
- 6.45 mm (0.254 in)
- 6.50 mm (0.256 in)
- 6.55 mm (0.258 in)

WHEEL BEARING ADJUSTMENT

Preliminary Inspection

IMPORTANT: Ensure the brakes are fully released and do not drag.

Pull or push the tire at the top back and forth in order to test the wheel bearing play.

- Use a pry bar under the tire as an alternative.
- If the wheel bearing adjustment is correct, the movement will be barely noticeable.
- If the movement is excessive, adjust the bearings.

Adjustment Procedure

Tools Required

J 2222-C Wheel Bearing Nut Wrench. See **Special Tools**.

Adjustment

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the axle shaft. Refer to **Rear Axle Shaft and/or Gasket Replacement**.

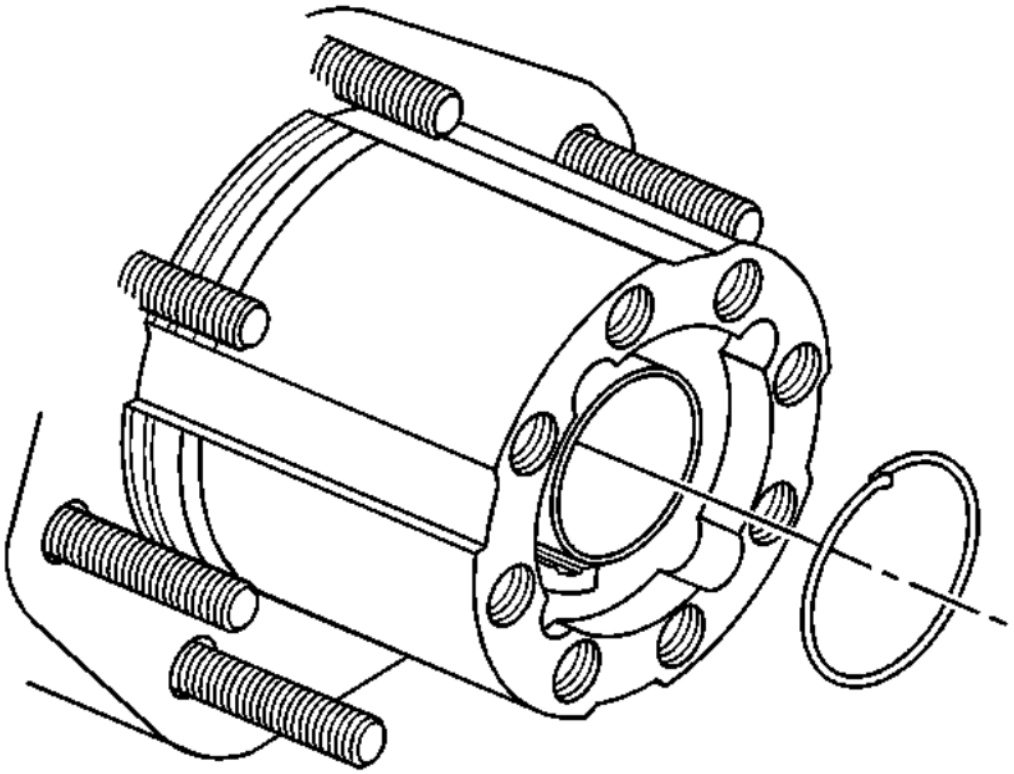


Fig. 258: Axle Nut Retaining Ring
Courtesy of GENERAL MOTORS CORP.

3. Remove the hub adjuster nut retaining ring.

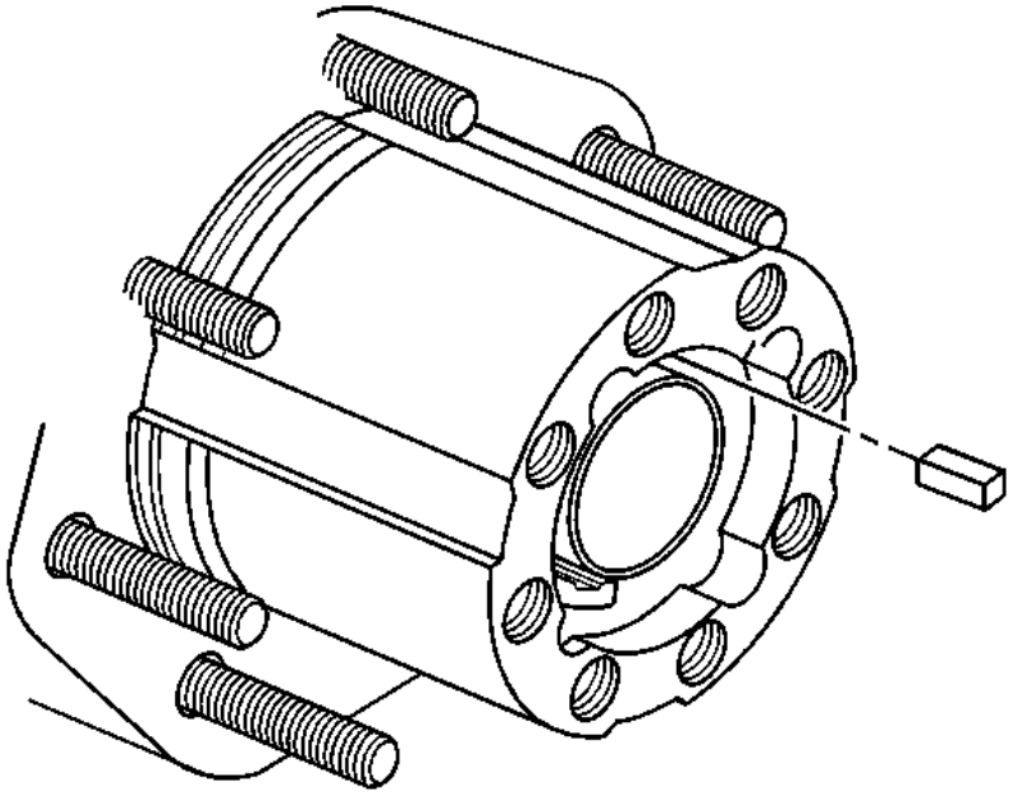


Fig. 259: Adjuster Nut Lock Key
Courtesy of GENERAL MOTORS CORP.

4. Remove the adjuster nut lock key.

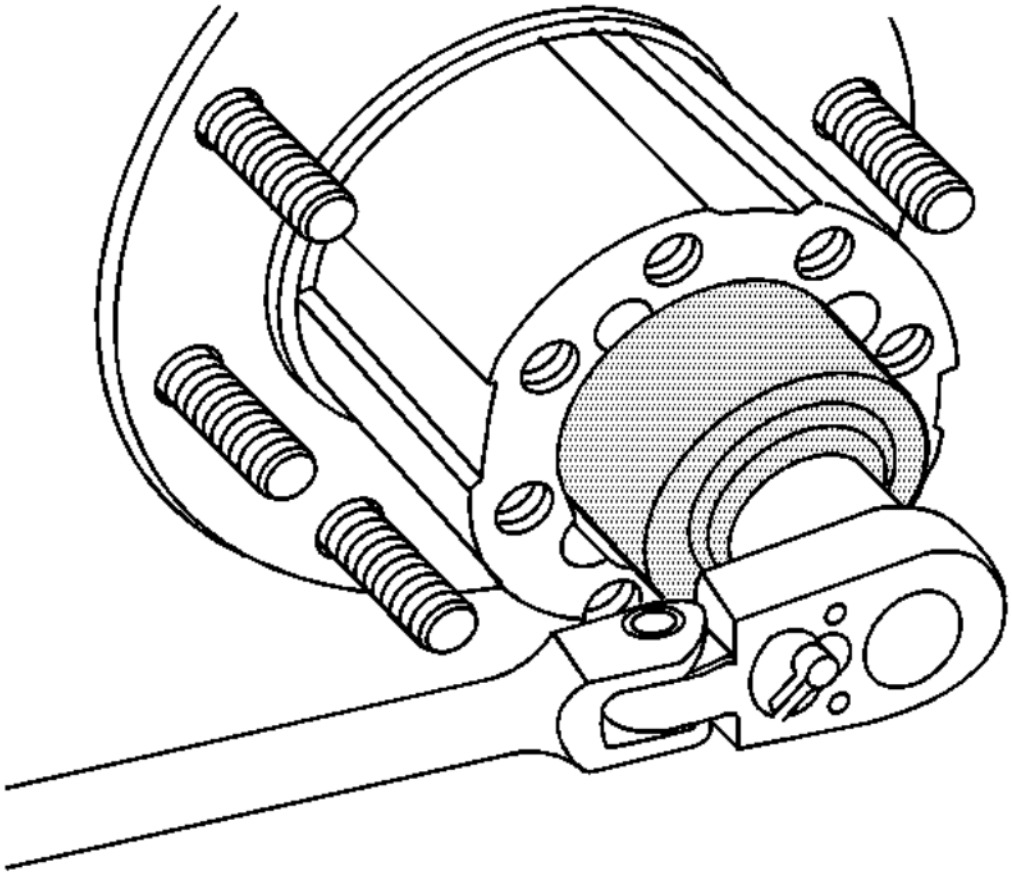


Fig. 260: Adjusting Nut & J 2222-C
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

5. Tighten the wheel bearing adjusting nut using the **J 2222-C** . See **Special Tools**.

   Rotate the hub in the opposite direction to the way the adjuster nut is turning.

   Ensure the inner bearing and the seal seats against the spindle shoulder.

   Tighten: Tighten the adjusting nut to 70 N.m (52 lb ft).

6. Turn the adjusting nut counterclockwise until the nut is loose using the **J 2222-C** . See

Special Tools.

7. Turn the adjusting nut clockwise until the nut contacts the bearing cone. Torque on the nut must be zero to finger tight.

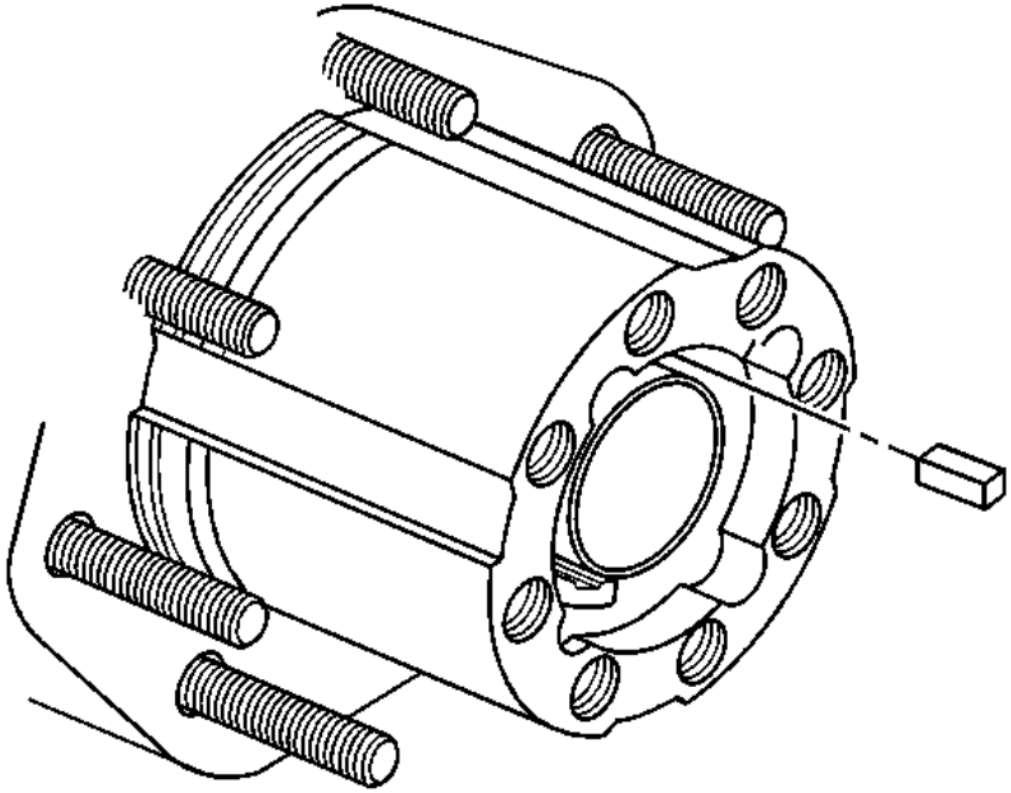


Fig. 261: Adjuster Nut Lock Key
Courtesy of GENERAL MOTORS CORP.

8. Insert the adjusting nut lock key into the keyway using one of the following procedures:
   - If the adjusting nut slot is in alignment with the keyway in the axle spindle, insert the adjusting nut lock key into the keyway in the axle spindle.

IMPORTANT: Do not turn the adjusting nut more than one slot counterclockwise in order to align the adjusting nut slot with the keyway in the axle spindle.

- If the adjusting nut slot is not aligned with the keyway in the axle spindle, turn the adjusting nut counterclockwise until the adjusting nut slot is in alignment with the keyway in the axle spindle and insert the adjusting nut lock key.

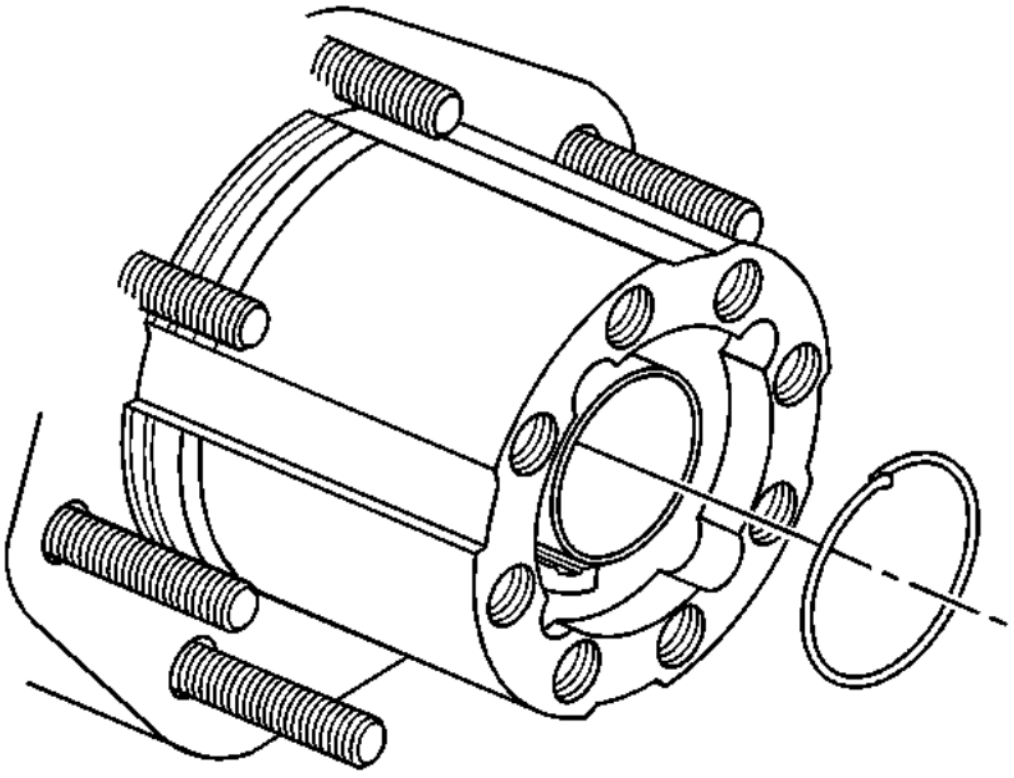


Fig. 262: Axle Nut Retaining Ring
Courtesy of GENERAL MOTORS CORP.

9. Install the retaining ring.
10. Install the axle shaft. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
11. Inspect the lubricant level and add, if necessary. Refer to **Rear Axle Lubricant Level Inspection (11.5 Inch Axle)** or **Rear Axle Lubricant Level Inspection (8.6, 9.5 LD Axle)** or **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
12. Lower the vehicle.

BACKLASH ADJUSTMENT (8.6 INCH AXLE)

Tools Required

- **J 8001** Dial Indicator Set
- **J 25025** Guide Pins. See **Special Tools**.
- **J 25588** Side Bearing Shim Installer. See **Special Tools**.

Adjustment

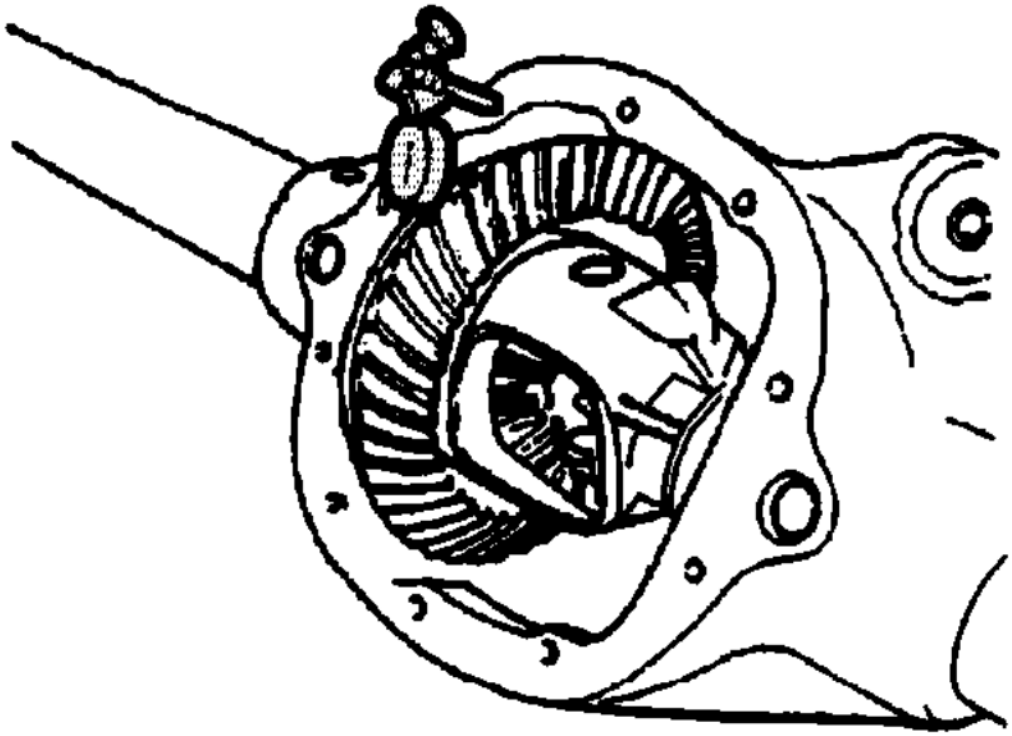


Fig. 263: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS CORP.

1. Install the **J 25025-1** and the **J 8001** to the axle housing as shown. See **Special Tools**.
2. Place the indicator stem of the **J 8001-3** at the heel end of a gear tooth. See **Special Tools**.
3. Set the **J 8001-3** so that the stem is aligned with the gear rotation and perpendicular to the tooth angle. See **Special Tools**.
4. Preload the dial of the **J 8001-3** . See **Special Tools**.

Align the needle and the dial face of the **J 8001-3** to ZERO. See **Special Tools**.

5. While holding the drive pinion stationary, move the ring gear back and forth.

   Measure and record the backlash.

6. Repeat the measuring procedure at eight points around the ring gear.

   Specification: The difference between the backlash at all of the measuring points should not vary by more than 0.05 mm (0.002 in).

7. If the difference between the backlash at all of the measuring points varies by more than 0.05 mm (0.002 in), inspect for the following conditions:
   - Burrs
   - A distorted case flange
   - Uneven bolting
8. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point measured should be:

   Specification: The backlash between the ring gear and the drive pinion should be between 0.08-0.25 mm (0.003-0.010 in) with a preferred backlash of 0.13-0.18 mm (0.005-0.007 in).

IMPORTANT:
- **Do not use the original cast iron production shims to adjust the backlash. Use service shims and spacers instead.**
- **Adjust the thickness of the shim pack on each side of the differential in equal amounts. This will maintain the correct axle side bearing preload.**
- **Moving 0.05 mm (0.002 in) of shim thickness from one side of the differential to the other will change the backlash adjustment approximately 0.03 mm (0.001 in).**

9. If the backlash is too small, increase the backlash using the following procedure:
   1. Remove the bearing cap bolts and the bearing caps.

      Mark the bearing caps left or right.

   2. Remove the differential case assembly with the bearing cups and the shims.

Mark the bearing cups and the shims left or right.

3. Measure the thickness of left side shim pack.

   Measure the production shim or the shim and service spacer in 3 locations.

   Measure each shim separately.

4. Calculate the average of the 3 measurements for each shim.

   Add the average of each of the shim measurements together.

   Record the measurement. This is the thickness for the left side shim pack.

5. Assemble a new left side shim pack by decreasing the appropriate amount of thickness from the original left side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004 in) of thickness from the left side shim pack.
6. Measure the thickness of right side shim pack.

   Measure the shim or the shim and service spacer in 3 locations.

   Measure each shim separately.

7. Calculate the average of the 3 measurements for each shim.

   Add the average of each of the shim measurements together.

   Record the measurement. This is the thickness for the right side shim pack.

8. Assemble a new right side shim pack by increasing the appropriate amount of thickness to the original right side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), add 0.10 mm (0.004 in) of thickness to the right side shim pack.

10. If the backlash is too large, decrease the backlash using the following procedure:
    1. Remove the bearing cap bolts and the bearing caps.

       Mark the bearing caps left or right.

2. Remove the differential case assembly with the bearing cups and the shims.

   Mark the bearing cups and the shims left or right.

3. Measure the thickness of left side shim pack.

   Measure the production shim or the shim and service spacer in 3 locations.

   Measure each shim separately.

4. Calculate the average of the 3 measurements for each shim.

   Add the average of each of the shim measurements together.

   Record the measurement. This is the thickness for the left side shim pack.

5. Assemble a new left side shim pack by increasing the appropriate amount of thickness to the original left side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), add 0.10 mm (0.004 in) of thickness to the left side shim pack.
6. Measure the thickness of right side shim pack.

   Measure the shim or the shim and service spacer in 3 locations.

   Measure each shim separately.

7. Calculate the average of the 3 measurements for each shim.

   Add the average of each of the shim measurements together.

   Record the measurement. This is the thickness for the right side shim pack.

8. Assemble a new right side shim pack by decreasing the appropriate amount of thickness to the original right side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to decrease the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004 in) of thickness to the right side shim pack.

11. Install the differential case assembly with the bearing cups.
12. Install the left side service spacer between the axle housing and the differential case.

13. Install the right side service spacer between the axle housing and the differential case.

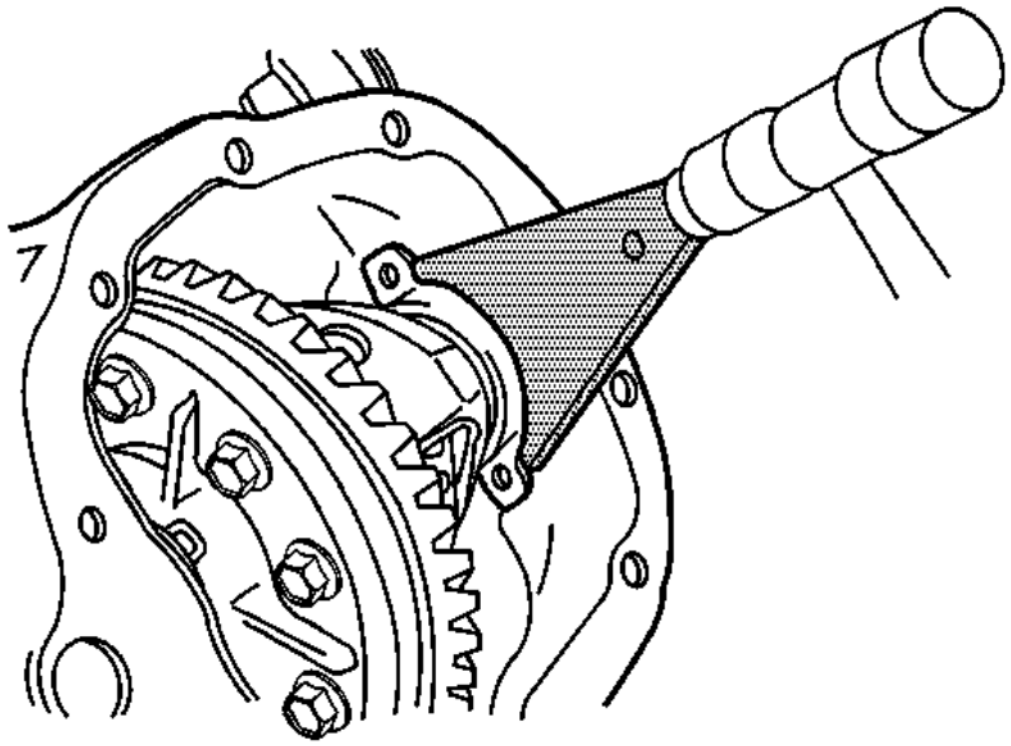


Fig. 264: Installing Left Side Service Shim Using J 25588
Courtesy of GENERAL MOTORS CORP.

14. Install the left side service shim or shims using the **J 25588** , if necessary. See **Special Tools**.

    The service shim or shims must be installed between the service spacer and the differential bearing cup.

15. Install the right side service shim or shims using the **J 25588** , if necessary. See **Special Tools**.

    The service shim or shims must be installed between the service spacer and the differential bearing cup.

NOTE: **Refer to Fastener Notice .**

16. Install the bearing caps and bolts.

    Tighten: Tighten the bolts to 75 N.m (55 lb ft).

17. Recheck the backlash and adjust, if necessary.
18. Once backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

BACKLASH ADJUSTMENT (10.5, 11.5 INCH AXLES)

Special Tools

- **J 8001** Dial Indicator Set
- **J 24429** Side Bearing Backlash Spanner. See **Special Tools**.
- **J 25025** Guide Pins. See **Special Tools**.

Adjustment

IMPORTANT:

- **Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.**
- **The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.**

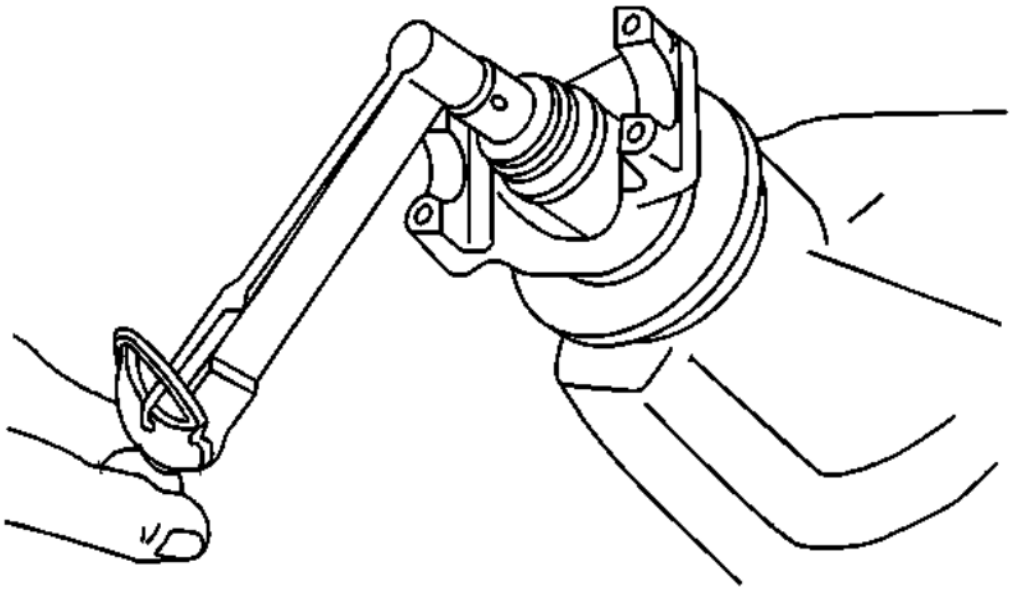


Fig. 265: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

1. Measure the rotating torque of the drive pinion and differential assembly using an inch-pound torque wrench.

   Specification: The rotating torque of the drive pinion and differential assembly should be 2.3-4.5 N.m (20-40 lb in) for new bearings or 1.7-3.4 N.m (15-30 lb in) for used bearings.

2. If the rotating torque is too low, tighten the differential bearing adjuster nuts in 1 slot increments until the specified rotating torque is obtained.
3. If the rotating torque is too high, loosen the differential bearing adjuster nuts in 1 slot increments until the specified rotating torque is obtained.
4. If the specification for the rotating torque of the drive pinion and differential assembly cannot be obtained by adjusting the differential bearing adjuster nut, remove the differential assembly, measure the rotating torque of the drive pinion and adjust as necessary. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)** and **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.

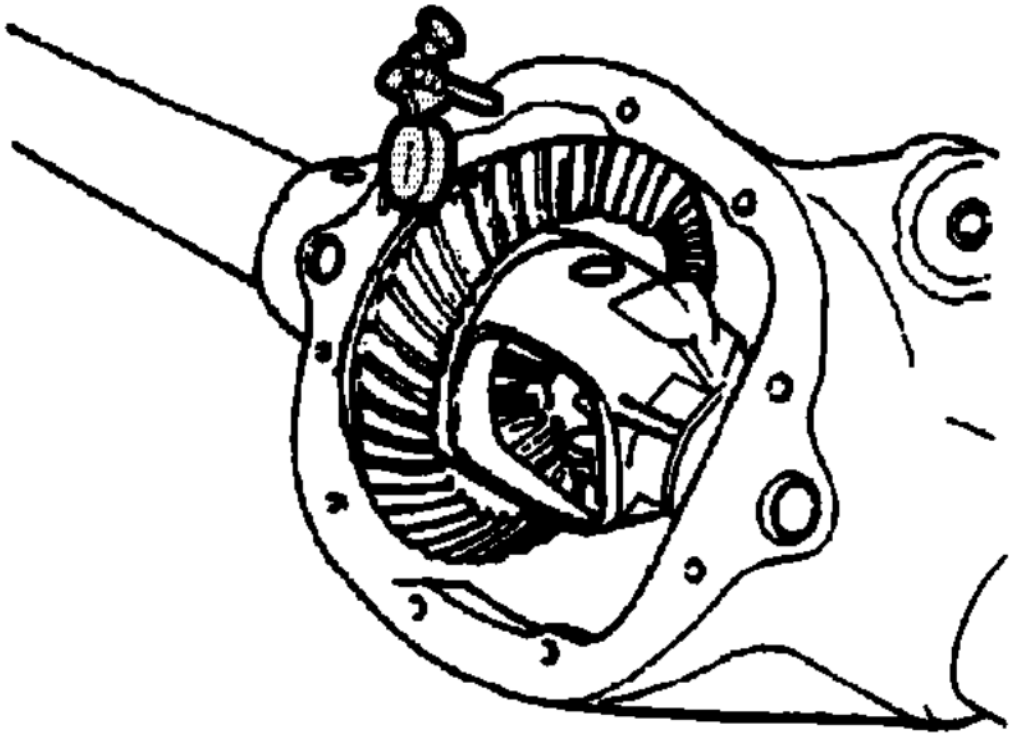


Fig. 266: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS CORP.

5. Install the **J 25025-1** and the **J 8001** to the axle housing as shown. See **Special Tools**.
6. Place the indicator stem of the **J 8001-3** at the heel end of a gear tooth. See **Special Tools**.
7. Set the **J 8001-3** so that the stem is aligned with the gear rotation and perpendicular to the tooth angle. See **Special Tools**.
8. Preload the dial of the **J 8001-3** . See **Special Tools**.

   Align the needle and the dial face of the **J 8001-3** to ZERO. See **Special Tools**.

9. While holding the drive pinion stationary, move the ring gear back and forth.

   Measure and record the backlash.

10. Repeat the measuring procedure at eight points around the ring gear.

Specification: The difference between the backlash at all of the measuring points should not vary by more than 0.05 mm (0.002 in).

11. If the difference between the backlash at all of the measuring points varies by more than 0.05 mm (0.002 in), inspect for the following conditions:
    - Burrs
    - A distorted case flange
    - Uneven bolting
12. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point measured should be:

    Specification: The backlash between the ring gear and the drive pinion should be between 0.08-0.25 mm (0.003-0.010 in) with a preferred backlash of 0.13-0.18 mm (0.005-0.007 in).

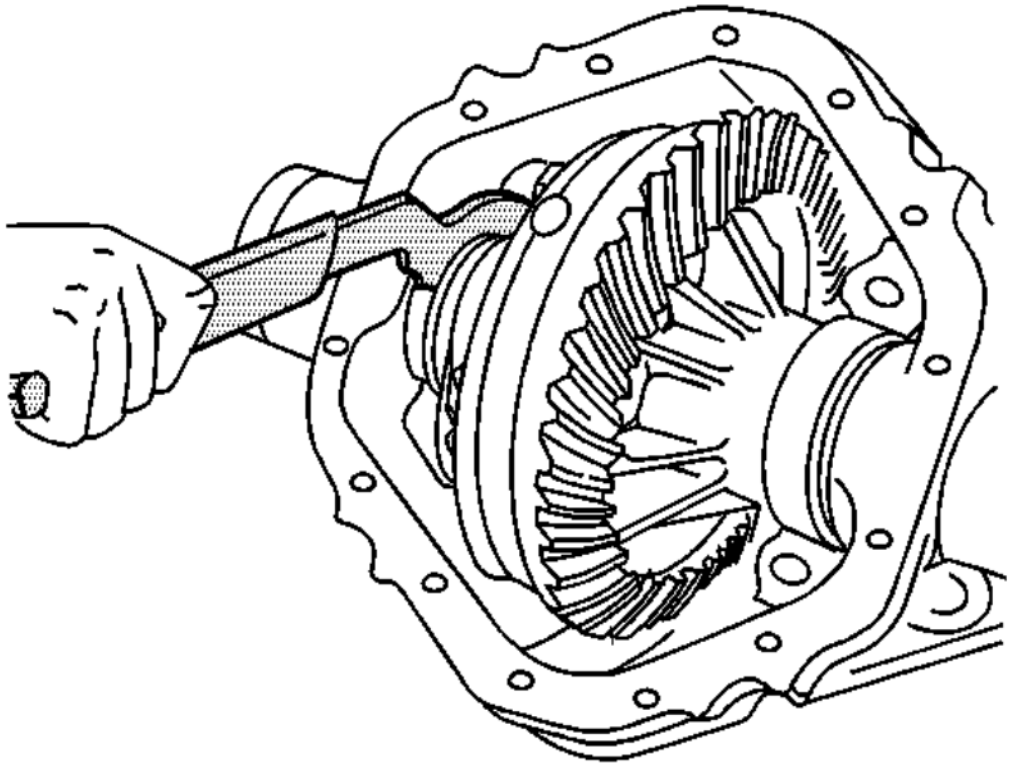


Fig. 267: Turning Adjusters Using J 24429
Courtesy of GENERAL MOTORS CORP.

13. If the backlash is not within specifications, adjust the backlash by performing the following steps:
    1. Remove the differential bearing adjuster nut retainers bolts.
    2. Remove the differential bearing adjuster nut retainers.
    3. Remove the bearing cap bolts.
    4. Remove the bearing caps. Mark the bearing caps left and right.
    5. If the backlash is too small, increase the backlash by turning the left differential bearing adjuster in one slot and the right differential bearing adjuster out one slot using the **J 24429** until the correct backlash is obtained. See **Special Tools**.
    6. If the backlash is too large, decrease the backlash by turning the right differential bearing adjuster in one slot and the left differential bearing adjuster out one slot using the **J 24429** until the correct backlash is obtained. See **Special Tools**.
14. Install the bearing caps.

NOTE: **Refer to Fastener Notice .**

15. Install the bearing cap bolts.

    Tighten:
    - Tighten the bearing cap bolts to 185 N.m (136 lb ft) (10.5 inch axle).
    - Tighten the bearing cap bolts to 207 N.m (153 lb ft) (11.5 inch axle).

16. Recheck the backlash following the steps above to verify that the backlash is within specifications.
17. Install the differential bearing adjuster nut retainers.
18. Install the differential bearing adjuster nut retainer bolts.

    Tighten: Tighten the differential bearing adjuster nut retainer nut bolts to 27 N.m (20 lb ft).

19. Measure the drive pinion and differential case side bearing preload and adjust, if necessary following the steps above.
20. Once the backlash and bearing preload is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

BACKLASH ADJUSTMENT (9.5 LD AXLE)

Special Tools

- **J 8001** Dial Indicator Set
- **J 24429** Side Bearing Backlash Spanner. See **Special Tools**.
- **J 25025** Guide Pins. See **Special Tools**.

Adjustment

IMPORTANT:

- **Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.**
- **The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.**

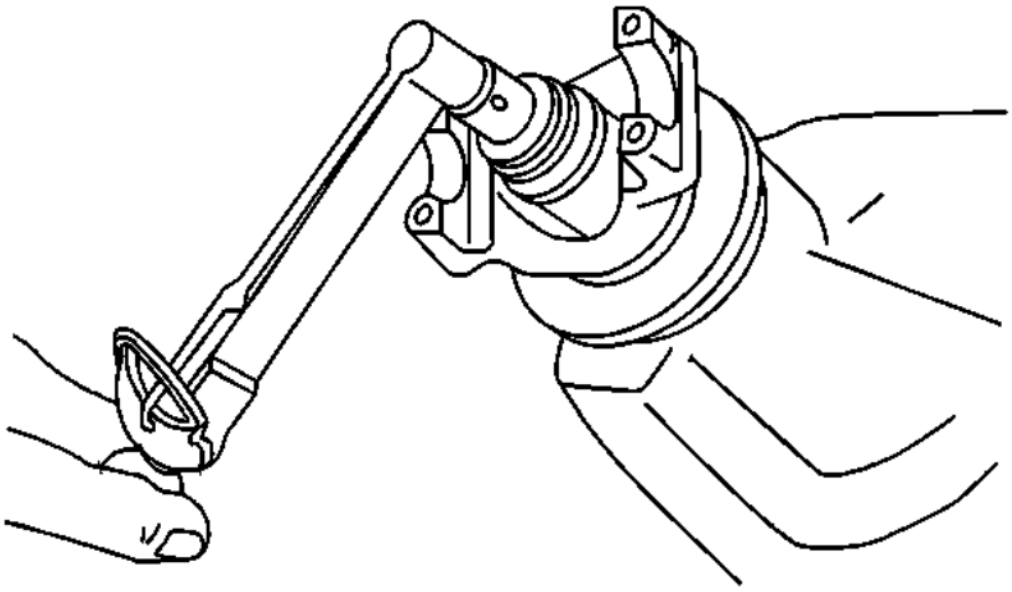


Fig. 268: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

1. Measure the rotating torque of the drive pinion and differential assembly using an inch-pound torque wrench.

   Specification: The rotating torque of the drive pinion and differential assembly should be 2.3-4.5 N.m (20-40 lb in) for new bearings or 1.7-3.4 N.m (15-30 lb in) for used bearings.

2. If the rotating torque is too low, tighten the differential bearing adjuster nut in 1 slot increments until the specified rotating torque is obtained.
3. If the rotating torque is too high, loosen the differential bearing adjuster nut in 1 slot increments until the specified rotating torque is obtained.
4. If the specification for the rotating torque of the drive pinion and differential assembly cannot be obtained by adjusting the differential bearing adjuster nut, remove the differential assembly, measure the rotating torque of the drive pinion and adjust as necessary. Refer to **Differential Replacement (8.6, 9.5/9.5LD Inch Axles)** or **Differential Replacement (10.5 Inch, 11.5 Inch Axle)** and **Drive Pinion Bearings Replacement (8.6, 9.5, 11.5 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.

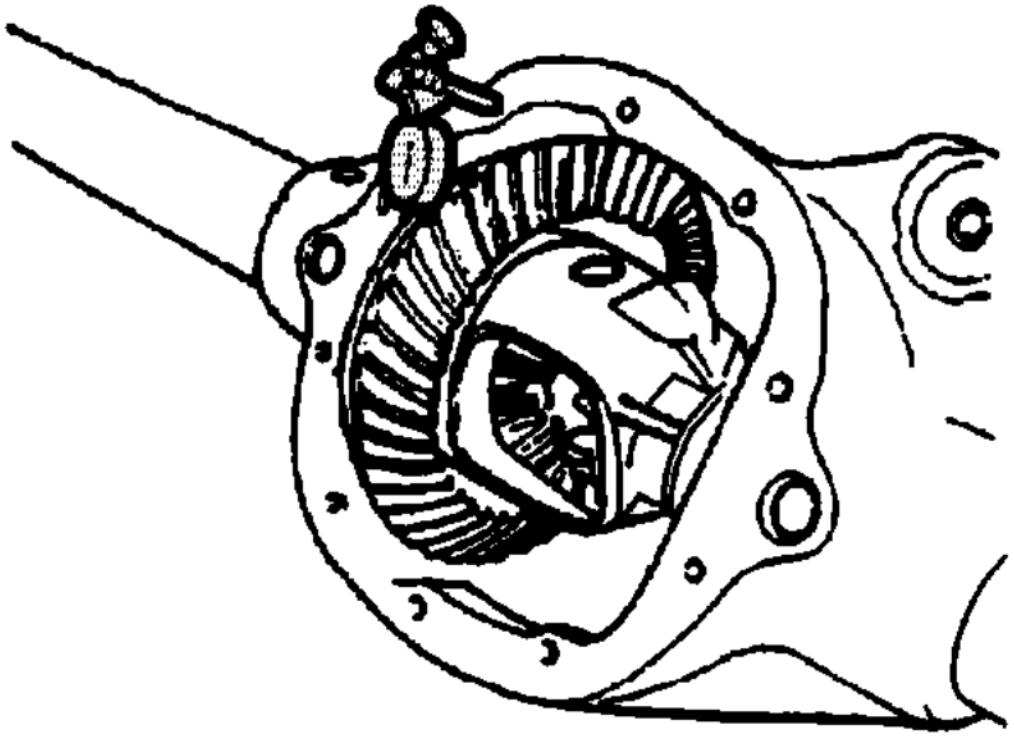


Fig. 269: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS CORP.

5. Install the **J 25025-1** and the **J 8001-3** to the axle housing as shown. See **Special Tools**.
6. Place the indicator stem of the **J 8001-3** at the heel end of a gear tooth. See **Special Tools**.
7. Set the **J 8001-3** so that the stem is aligned with the gear rotation and perpendicular to the tooth angle. See **Special Tools**.
8. Preload the dial of the **J 8001-3** approximately 3/4 of a turn. See **Special Tools**.

   Align the needle and the dial face of the **J 8001-3** to ZERO. See **Special Tools**.

9. While holding the drive pinion stationary, move the ring gear back and forth.

   Measure and record the backlash.

10. Repeat the measuring procedure at eight points around the ring gear.

Specification: The difference between the backlash at all of the measuring points should not vary by more than 0.05 mm (0.002 in).

11. If the difference between the backlash at all of the measuring points varies by more than 0.05 mm (0.002 in), inspect for the following conditions:
    - Burrs
    - A distorted case flange
    - Uneven bolting
12. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point measured should be:

    Specification: The backlash between the ring gear and the drive pinion should be between 0.08-0.25 mm (0.003-0.010 in) with a preferred backlash of 0.13-0.18 mm (0.005-0.007 in).

    IMPORTANT: Increasing or decreasing the shim thickness by 0.05 mm (0.002 in) will change the backlash adjustment approximately 0.03 mm (0.001 in).

13. If the backlash is not within specifications, adjust the backlash by performing the following procedure:
    1. Remove the differential bearing adjuster nut retainer bolt.
    2. Remove the differential bearing adjuster nut retainer.
    3. Loosen the bearing cap bolts.
14. Do not remove the bearing cap bolts.
    1. Loosen the differential bearing adjuster nut using the **J 24429** . See **Special Tools**.
    2. Remove the differential side bearing shim.
    3. Measure the thickness of the shim.
15. Calculate the average of the 3 measurements.
16. Record the measurement.
    - If the backlash is too small, select a smaller shim than the one that was removed. For example, to increase the backlash by 0.05 mm (0.002 in), select a shim that is 0.10 mm (0.004 in) thinner than the shim that was removed.
    - If the backlash is too large, select a larger shim than the one that was removed. For example, to increase the backlash by 0.05 mm (0.002 in), select a shim that is 0.10 mm (0.004 in) thicker than the shim that was removed.

- Install the shim.

17. Tighten the differential bearing adjuster nut using the **J 24429** until the differential bearing adjuster nut is seated against the bearing cup. See **Special Tools**.
18. Once the differential bearing adjuster is seated against the differential bearing, tighten the differential bearing adjuster nut using the **J 24429** the following additional amounts:. See **Special Tools**.

    Tighten:

    - For used bearings, tighten the differential bearing adjuster nut an additional 2 slots.
    - For new bearings, tighten the differential bearing adjuster nut an additional 3 slots.

    NOTE: Refer to Fastener Notice .

19. Tighten the differential bearing cap bolts.

    Tighten: Tighten the bearing cap bolts to 85 N.m (63 lb ft).

20. Recheck the backlash following the steps above to verify that the backlash is within specifications.
21. Install the differential bearing adjuster nut retainer.
22. Install the differential bearing adjuster nut retainer bolt.

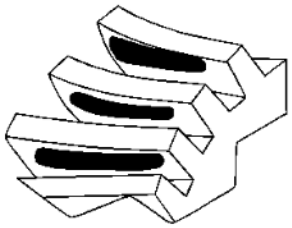
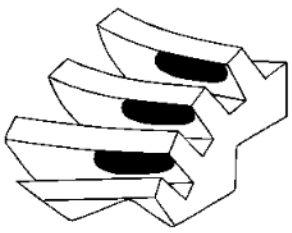
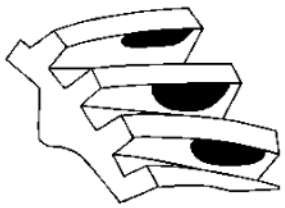
    Tighten: Tighten the differential bearing adjuster nut retainer nut bolt to 26 N.m (19 lb ft).

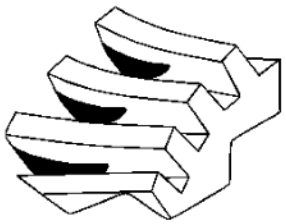
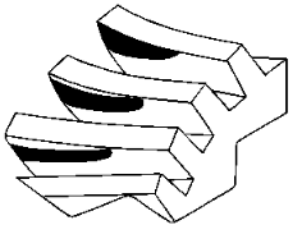
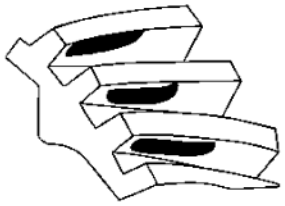
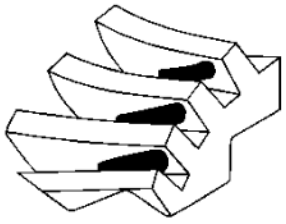
23. Measure the drive pinion and differential case side bearing preload and adjust, if necessary following the steps above.
24. Once the backlash and bearing preload is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

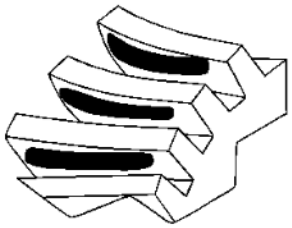
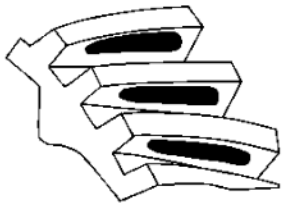
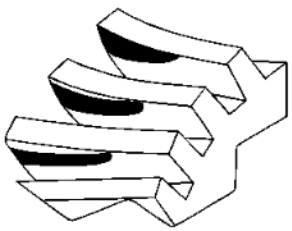
GEAR TOOTH CONTACT PATTERN INSPECTION

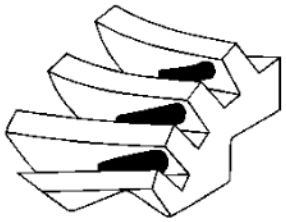
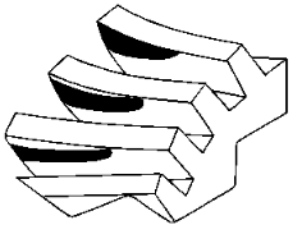
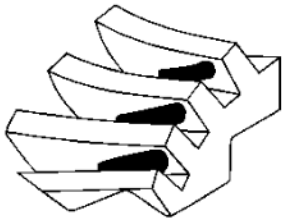
Pattern Evaluation (Ring Gear)

Drive Side	Coast Side	Pattern Condition	Corrective Action
Heel Toe	Toe Heel		

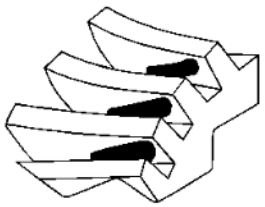
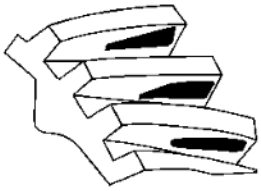
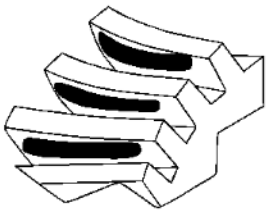
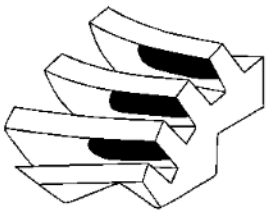
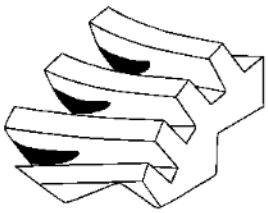
		Drive Side Centered - Coast Side Centered	No correction required.
Drive Pinion Issue - 2 Cut Gearset			
		Drive Side Low Heel Contact - Coast Side High Heel Contact	1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion closer to the ring gear by increasing the thickness of the pinion shim on a one-piece axle housing or by decreasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.
			1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is

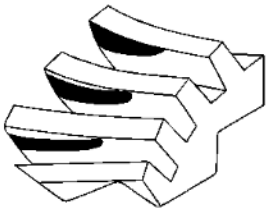
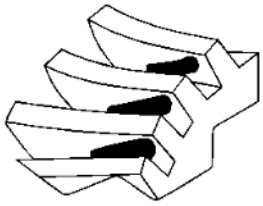
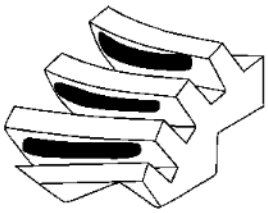
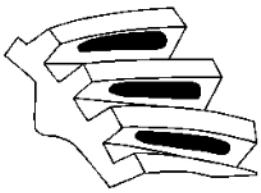
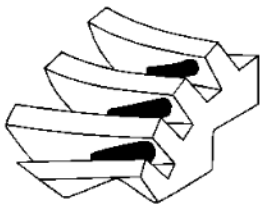
		Drive Side Low Heel Contact - Coast Side Low Toe Contact	correct, move the drive pinion away from the ring gear by decreasing the thickness of the pinion shim on a one-piece axle housing or by increasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.
Backlash Issue			
		Drive Side High Heel Contact - Coast Side High Toe Contact	Backlash incorrect. The ring gear is too far away from the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).
		Drive Side Low Toe Contact - Coast Side Low Heel Contact	Backlash incorrect. The ring gear is too close to the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).
		Drive Side Centered - Coast Side Centered	No correction required.

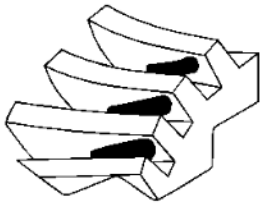
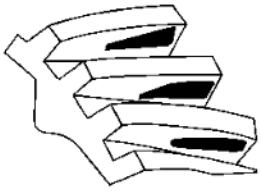
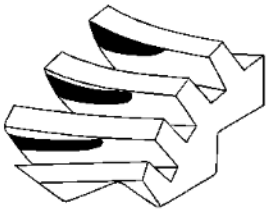
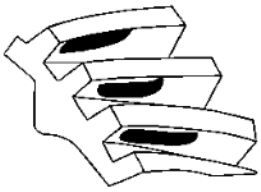
			
Drive Pinion Issue - 5 Cut Gearset			
		Drive Side High and Slightly Heel Contact - Coast Side High and Slightly Toe Contact	1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion closer to the ring gear by increasing the thickness of the pinion shim on a one-piece axle housing or by decreasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.
			1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is

		Drive Side Low and Slightly Heel Contact - Coast Side High and Slightly Toe Contact	correct, move the drive pinion away from the ring gear by decreasing the thickness of the pinion shim on a one-piece axle housing or by increasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.
Backlash Issue			
		Drive Side Heel Contact - Coast Side Toe Contact	Backlash incorrect. The ring gear is too far away from the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).
		Drive Side Toe Contact - Coast Side Heel Contact	Backlash incorrect. The ring gear is too close to the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).

Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
Face Hobbing				
	Toe Contact		Heel Contact	Pinion shim correct.

				Increase backlash.
	Desirable Pattern - Drive pattern should be centered on tooth		Desirable Pattern - Coast pattern should be center to slightly toe on tooth	No correction required.
	Top Toe Contact		Top Heel Contact	Backlash correct. Increase in pinion shim.
	Root Heel Contact		Root Toe Contact	Backlash correct. Decrease in pinion shim.
	Top Heel Contact		Top Toe Contact	Pinion shim correct. Decrease backlash.

				
	Root Toe Contact		Root Heel Contact	Pinion shim correct. Increase backlash.
Face Milling				
	Desirable Pattern - Drive pattern should be centered on tooth		Desirable Pattern - Coast pattern should be center to slightly toe on tooth	No correction required.
	Top and Slightly Heel Contact		Top and Slightly Toe Contact	Backlash correct. Increase in pinion shim.
	Root and Slightly Toe Contact		Root and Slightly Heel Contact	Backlash correct. Decrease in pinion shim.

				
	Heel Contact		Toe Contact	Pinion shim correct. Decrease backlash.

LOCKING DIFFERENTIAL DISASSEMBLE (8.6, 9.5LD AXLES)

Tools Required

J 26252 Locking Differential Governor Remover. See **Special Tools**.

Disassemble

1. Remove the ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

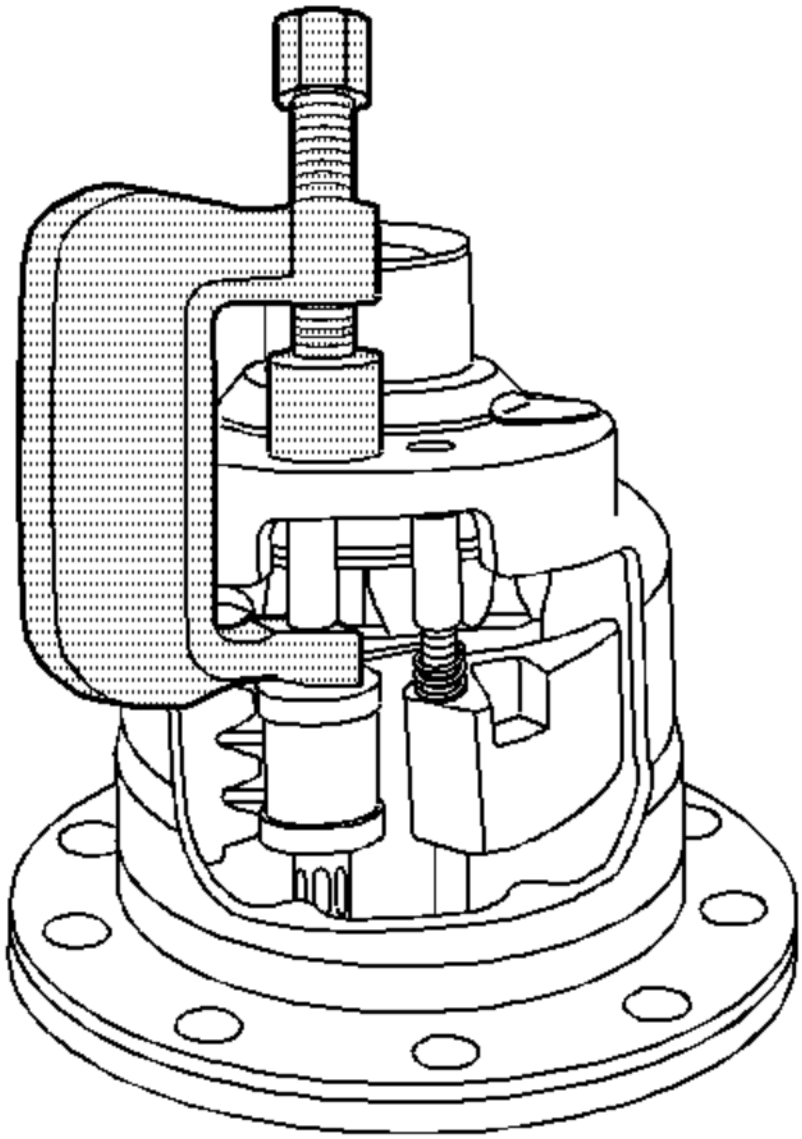


Fig. 270: Removing Governor Bushing
Courtesy of GENERAL MOTORS CORP.

2. Remove the governor bushing using the **J 26252** . See **Special Tools**.
3. Remove the governor assembly.

To aid in the removal of the governor assembly, turn the side gear as necessary to position the governor assembly between two of the side gear teeth.

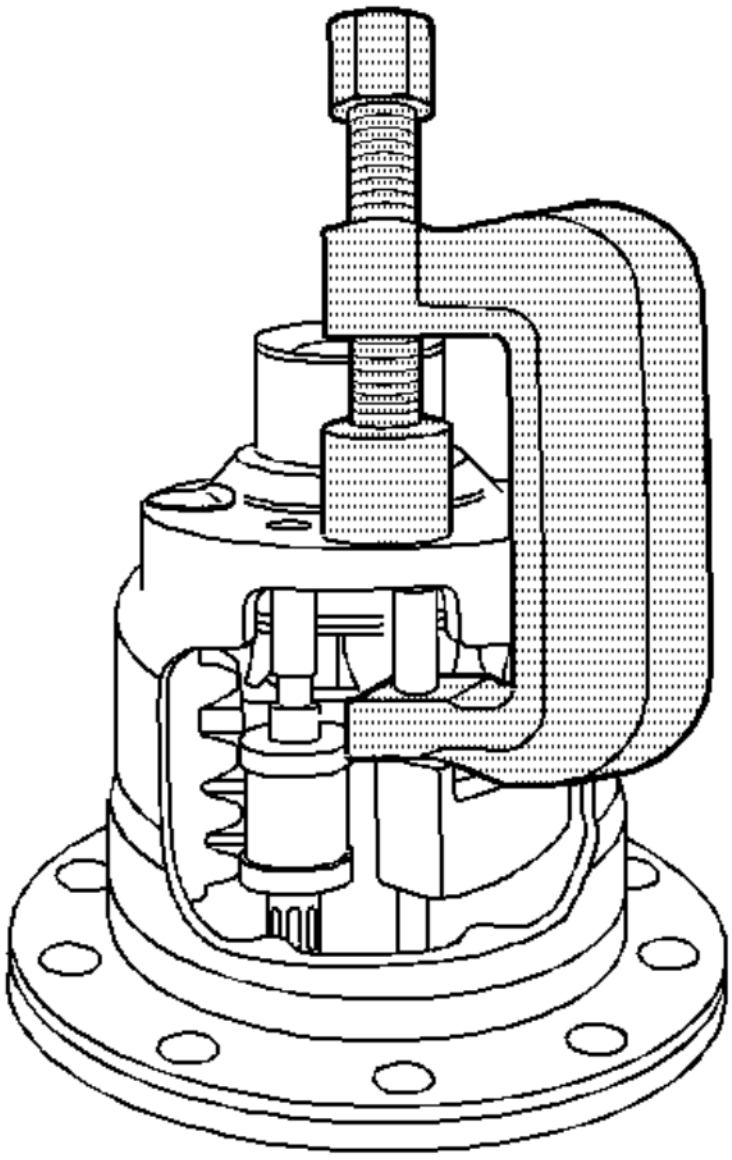


Fig. 271: Removing Latching Bracket Assembly Bushing
Courtesy of GENERAL MOTORS CORP.

4. Remove the latching bracket assembly bushing using the **J 26252** . See **Special Tools**.

   To aid in the removal of the latching bracket assembly, turn the side gear as necessary to position the latching bracket assembly between two of the side gear teeth.

5. Remove the pinion shaft lock bolt.
6. Remove the pinion shaft.
7. Remove the differential pinion gears and the thrust washers.

   Rotate the pinion gears and roll the pinion gears and the thrust washers out of the case through the differential window.

   Mark the pinion gears and thrust washers accordingly for re-assembly.

8. Remove the thrust block.
9. Remove the right side gear and clutch discs assembly.
10. Remove the right side shim.

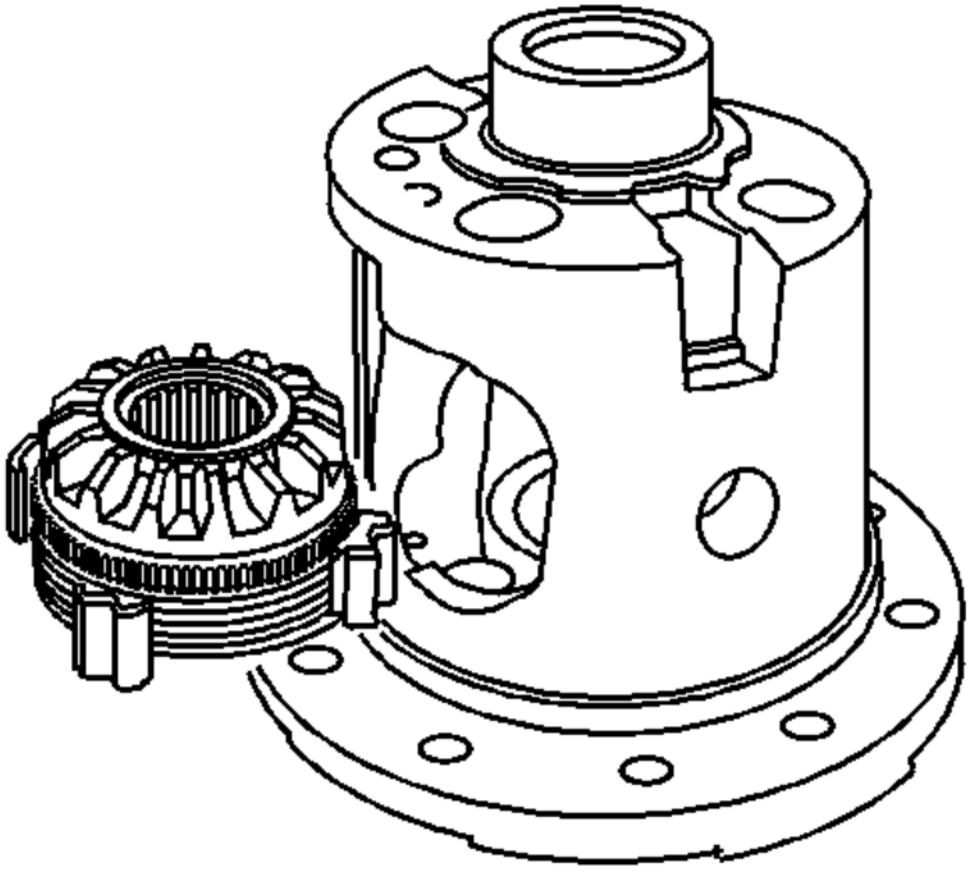


Fig. 272: View Of Left Side Gear Cam Unit & Clutch Disc Assembly
Courtesy of GENERAL MOTORS CORP.

11. Remove the left side gear cam unit and clutch disc assembly.

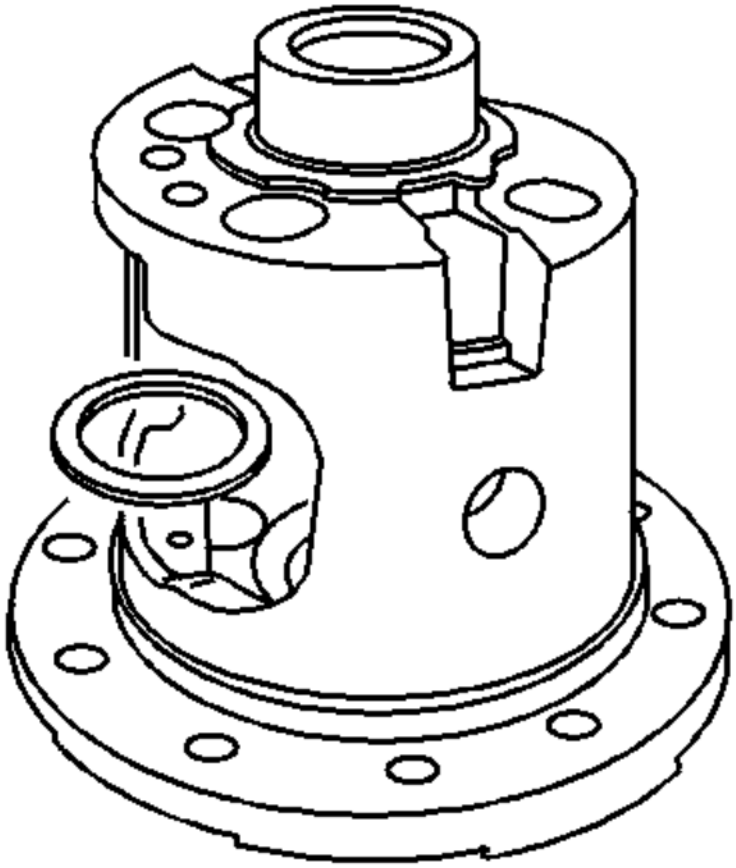


Fig. 273: View Of Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS CORP.

12. Remove the left side gear thrust washer.

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY DISASSEMBLE (9.5 INCH AXLE)

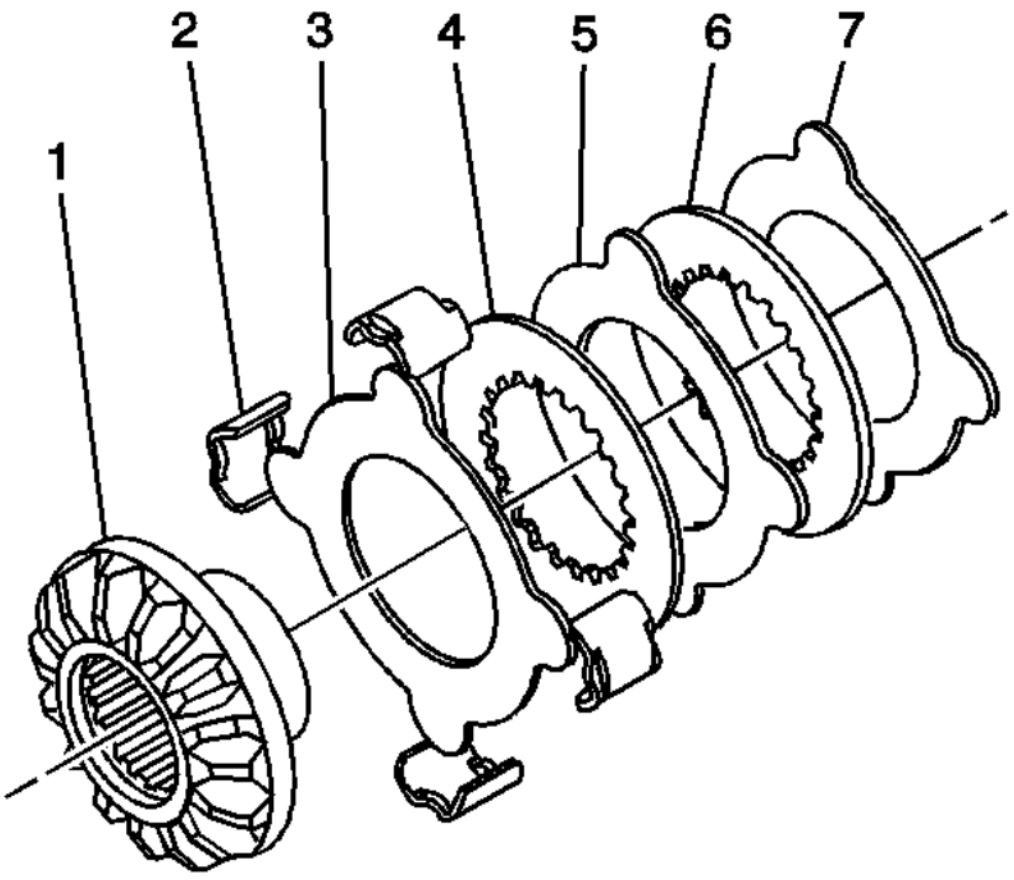


Fig. 274: View Of Locking Differential Clutch Disc Assembly (9.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

1. Remove the guide clips (2).
2. Remove the clutch discs and the splined discs (3-7) from the locking differential side gear (1).

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY DISASSEMBLE (8.6 INCH AXLE)

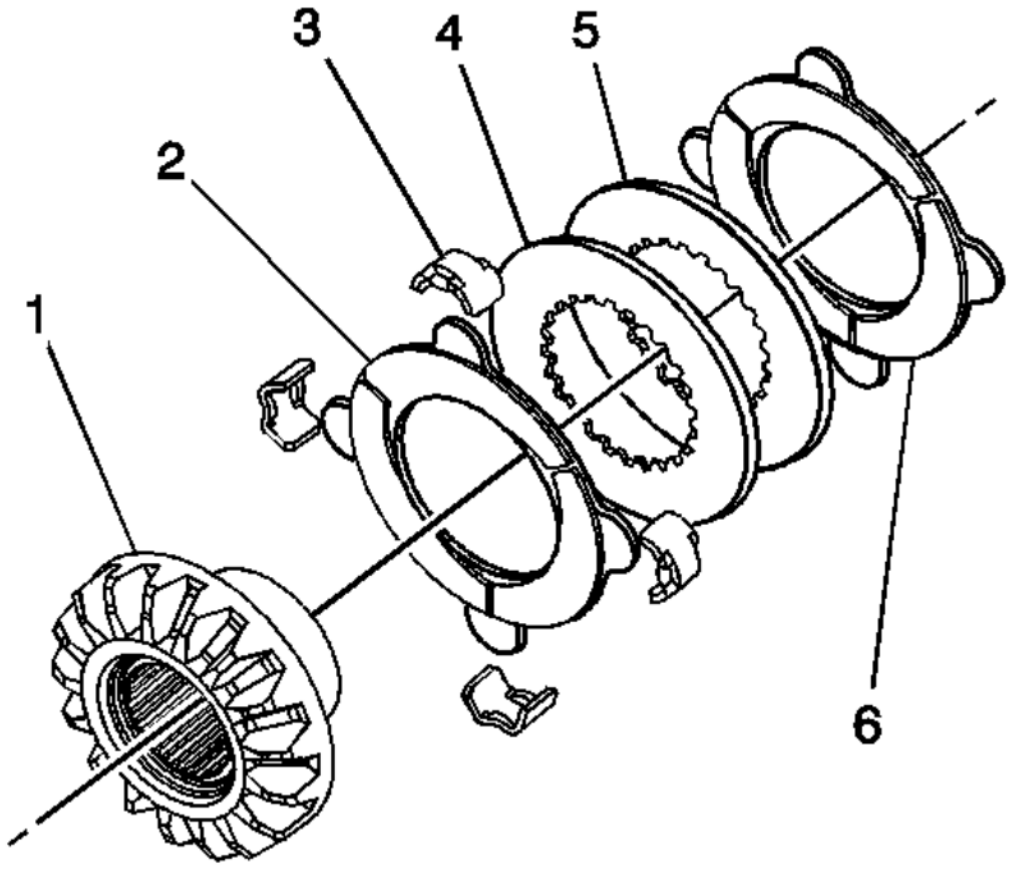


Fig. 275: View Of Locking Differential Clutch Disc Assembly (8.6 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

1. Remove the guide clips (3).
2. Remove the clutch discs and the splined discs (2, 4-6) from the locking differential side gear (1).

LOCKING DIFFERENTIAL CAM UNIT DISASSEMBLE (9.5 INCH AXLE)

Tools Required

- **J 22912-01** Split Plate Bearing Puller
- **J 45232** Differential Bearing Adjuster Needle Bearing Installer - LH. See **Special Tools**.

Disassemble

1. Measure and record the overall length of the gear assembly from the front of the gear to the thrust sleeve, including the side gear thrust washer.
2. Remove the guide clips.

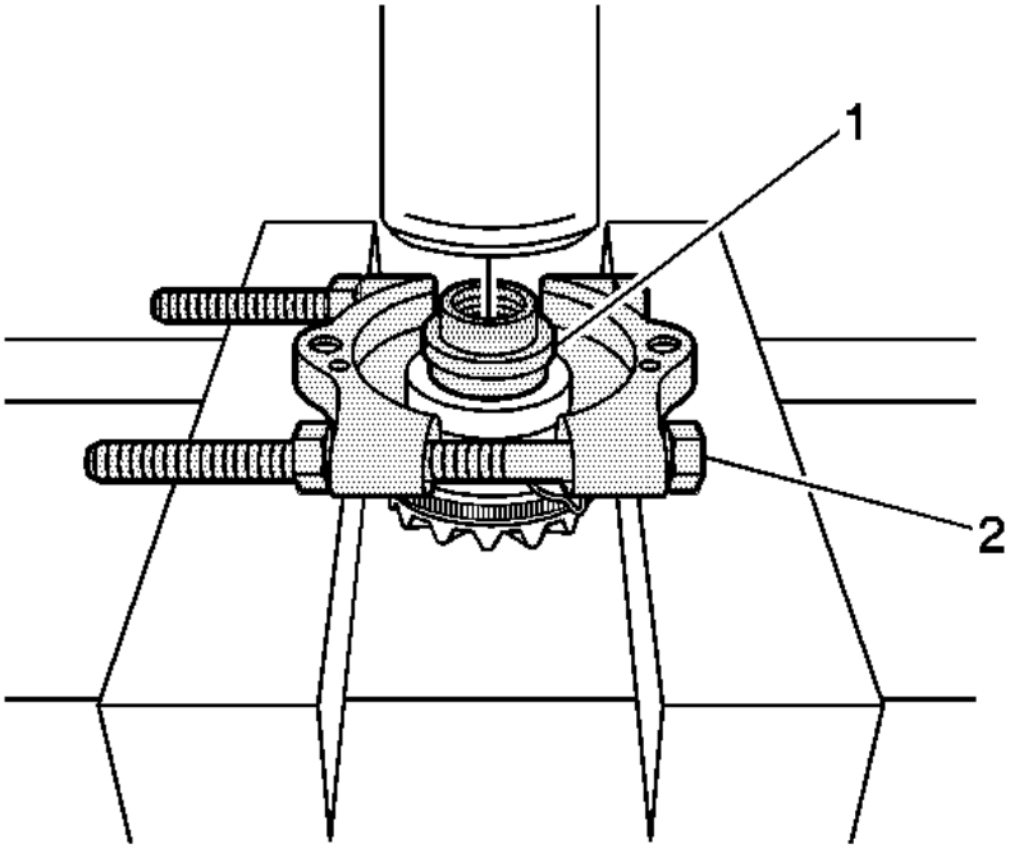


Fig. 276: Removing Thrust Sleeve Using J 45232 & J 22912-O1
Courtesy of GENERAL MOTORS CORP.

3. Remove the thrust sleeve using the **J 22912-O1** (2) and the **J 45232** (1), if necessary, and a hydraulic press. See **Special Tools**.

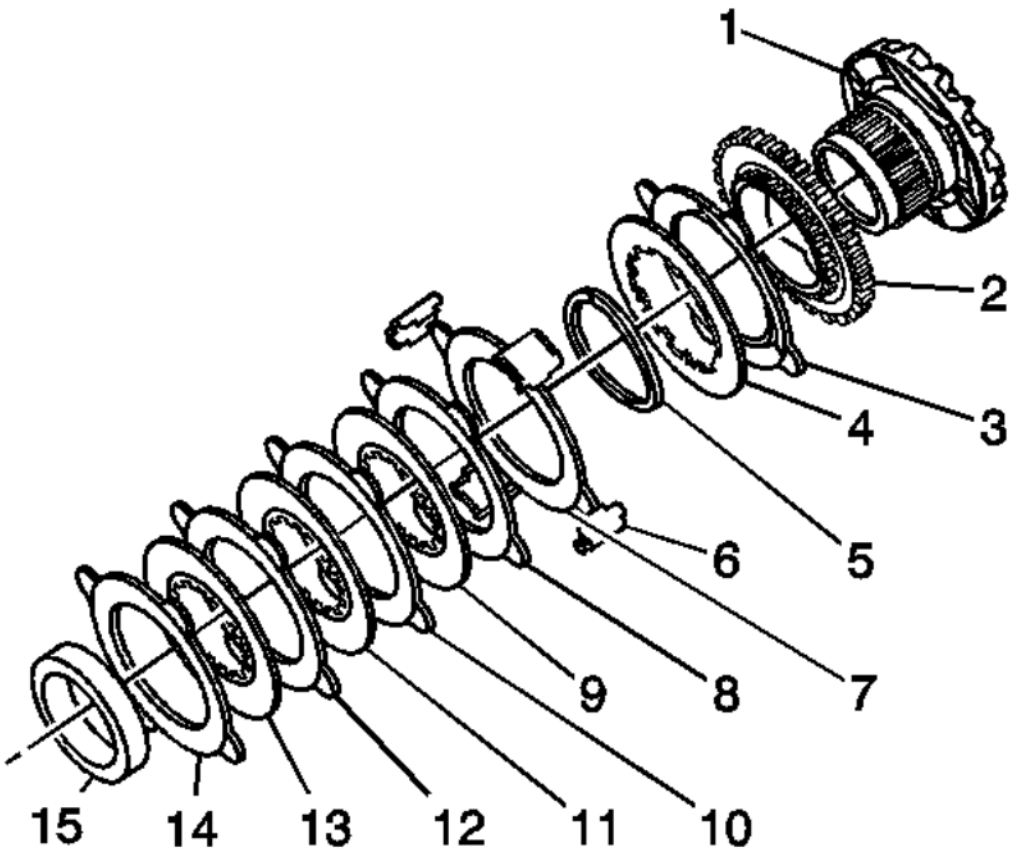


Fig. 277: Locking Differential Side Gear Cam Unit & Clutch Disc Assembly (9.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

4. Disassemble the locking differential side gear cam unit and clutch disc assembly as follows:
    1. Remove the clutch discs and the splined discs (7-14).
    2. Remove the wave washer (5).
    3. Remove the fuse disc (4).
    4. Remove the carbon eared disc (3).
    5. Disassemble the cam plate (2) from the cam side gear (1).

LOCKING DIFFERENTIAL CLEANING AND INSPECTION

1. Clean all the parts with an approved solvent.
2. Visually inspect all the parts for excessive wear or breakage. Replace the parts if necessary.
3. Inspect the pinion gear and the side gear teeth for any the following conditions:
   - Wear
   - Cracks
   - Scoring
   - Spalling
4. Inspect the thrust washers for wear.
5. Inspect the fit of the side gears on the axle shafts.
6. Inspect the differential case for cracks and scoring.

IMPORTANT: Do not replace the thrust sleeve unless it is necessary.

7. Inspect the thrust sleeve for excessive wear.
8. Inspect the side gear bore for scoring. If scoring is present, replace the entire differential.
9. Replace the differential if you find any damage to the case.

LOCKING DIFFERENTIAL CAM UNIT ASSEMBLE (8.6 INCH AXLE)

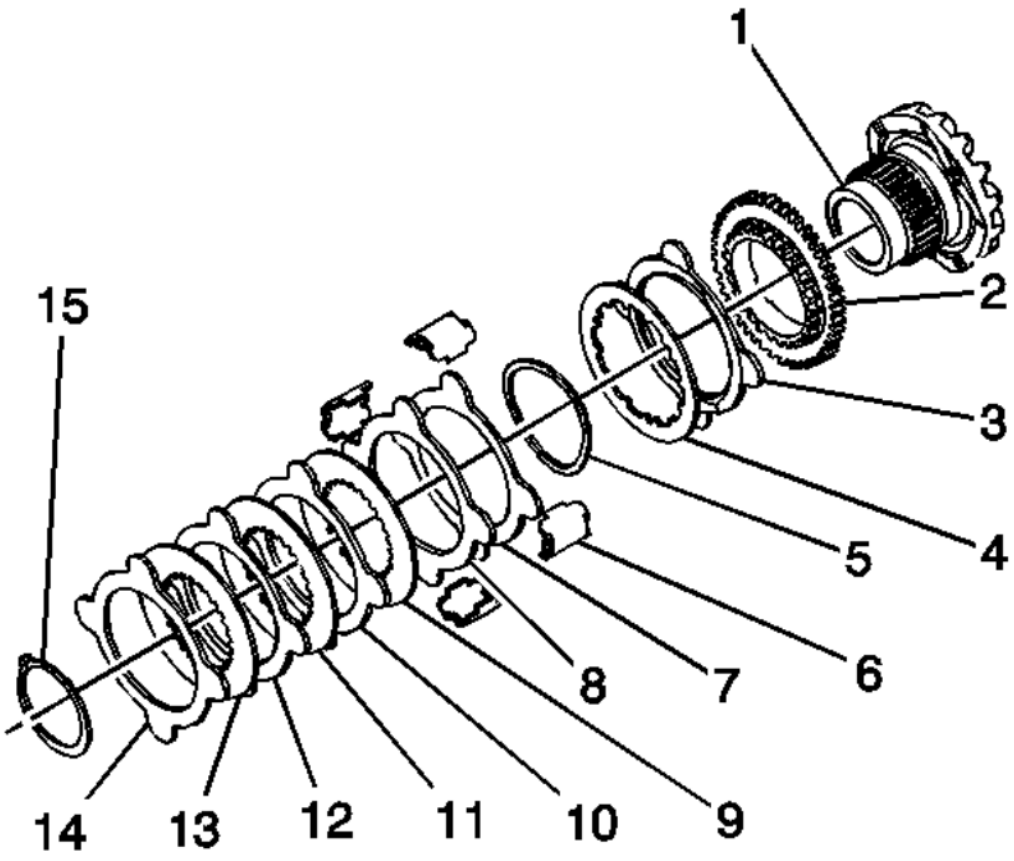


Fig. 278: Exploded View Of Locking Differential Side Gear Cam Unit & Clutch Disc Assembly
Courtesy of GENERAL MOTORS CORP.

1. Apply axle lubricant, GM P/N 12378261 (Canadian P/N 10953455) or equivalent meeting GM Specification 9986115, to the surface of each disc.
2. Assemble the left side or the flange-end side locking differential side gear cam unit and clutch disc assembly as follows:
    1. Install the cam plate (2) to the cam side gear (1).
    2. Install the carbon-faced eared disc (3).
    3. Install the fuse disc (4).
    4. Install the 1st non-carbon eared disc (7).
    5. Install the 2nd non-carbon eared disc (8).

6. Install the wave washer (5).
7. Install the 1st splined disc (9).
8. Install the 3rd non-carbon eared disc (10).
9. Install the 2nd splined disc (11).
10. Install the 4th non-carbon eared disc (12).
11. Install the 3rd splined disc (13).
12. Install the 5th non-carbon eared disc (14).
13. Install the retaining ring (15).

    Compress the clutch disc assembly and align the teeth on the 3rd splined disc with the teeth on the cam plate in order to seat the retaining ring in the groove on the cam side gear.

14. Install the guide clips (2) to the clutch disc assembly.

    Apply chassis grease, GM P/N 12377985 (Canadian P/N 88901242) or equivalent, to the guide clips in order to hold the clips in place on the disc ears.

LOCKING DIFFERENTIAL CAM UNIT ASSEMBLE (9.5 INCH AXLE)

Tools Required

J 29710 Differential Side Bearing Installer

Assemble

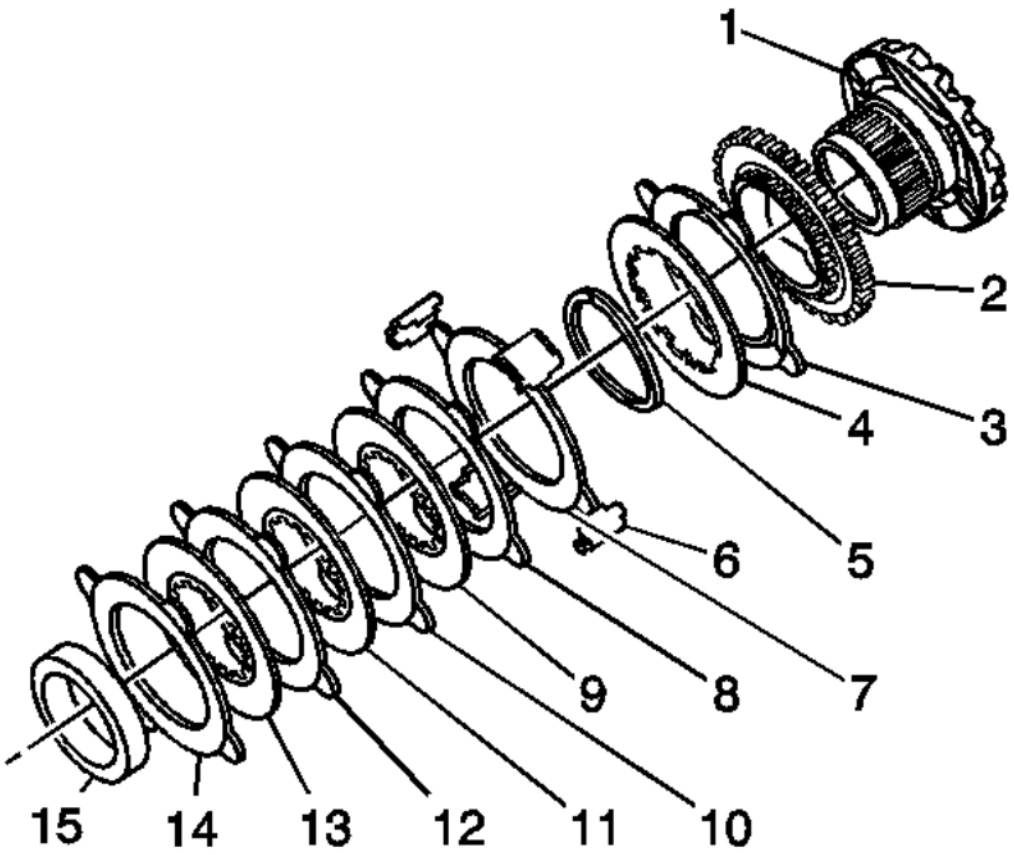


Fig. 279: Locking Differential Side Gear Cam Unit & Clutch Disc Assembly (9.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

1. Apply axle lubricant, GM P/N 12378261 (Canadian P/N 10953455) or equivalent meeting GM Specification 9986115, to the surface of each disc.
2. Assemble the left side or the flange-end side locking differential side gear cam unit and clutch disc assembly as follows:
    1. Install the cam plate (2) to the cam side gear (1).
    2. Install the carbon-faced eared disc (3).
    3. Install the fuse disc (4).
    4. Install the wave washer (5).
    5. Install the 1st non-carbon eared disc (7).

6. Install the 2nd non-carbon eared disc (8).
7. Install the 1st splined disc (9).
8. Install the 3rd non-carbon eared disc (10).
9. Install the 2nd splined disc (11).
10. Install the 4th non-carbon eared disc (12).
11. Install the 3rd splined disc (13).
12. Install the 5th non-carbon eared disc (14).
13. Align the splined discs with the teeth on the cam plate in order to compress the clutch disc assembly.

3. Install the thrust sleeve (15) onto the cam side gear.

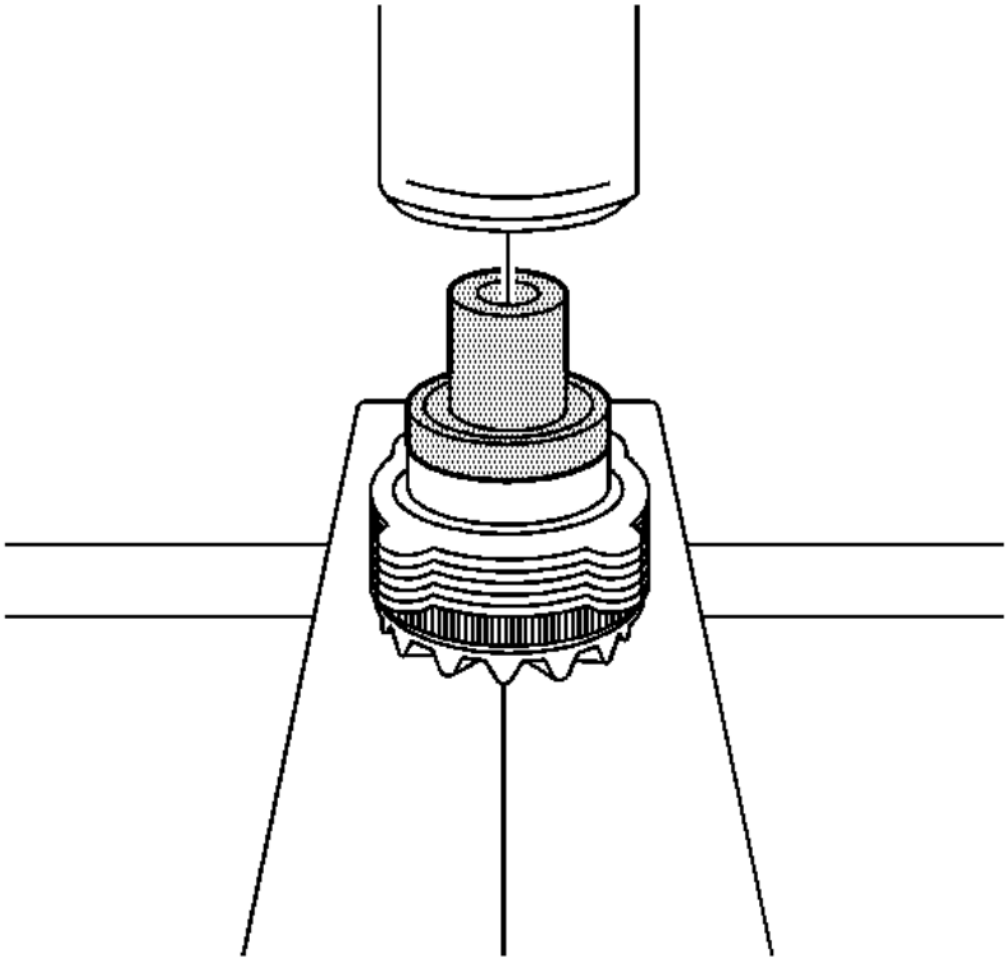


Fig. 280: Installing Thrust Sleeve Onto Cam Side Gear (9.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

4. Install the thrust sleeve onto the cam side gear using a hydraulic press and the **J 29710** , if necessary, until the thrust sleeve is fully seated onto the locking differential cam gear.
5. If the cam side gear or the thrust sleeve has been replaced, measure the overall length of the gear assembly by doing the following:
    1. Place the locking differential clutch disc thrust washer on top of the thrust sleeve.
    2. Measure the overall length of the gear assembly from the front of the cam side gear to the back of the locking differential clutch disc thrust washer.

3. Compare this measurement to the measurement obtained during disassembly.
4. If the new reading is more than 0.762 mm (0.003 in) higher or lower than the original, select a locking differential clutch disc thrust washer that will return the reading closest to the original reading.

6. Align the ears of all the clutch discs.
7. Install the guide clips to the clutch disc assembly.

Apply chassis grease, GM P/N 12377985 (Canadian P/N 88901242) or equivalent, to the guide clips in order to hold the clips in place on the disc ears.

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY ASSEMBLE (8.6 INCH AXLE)

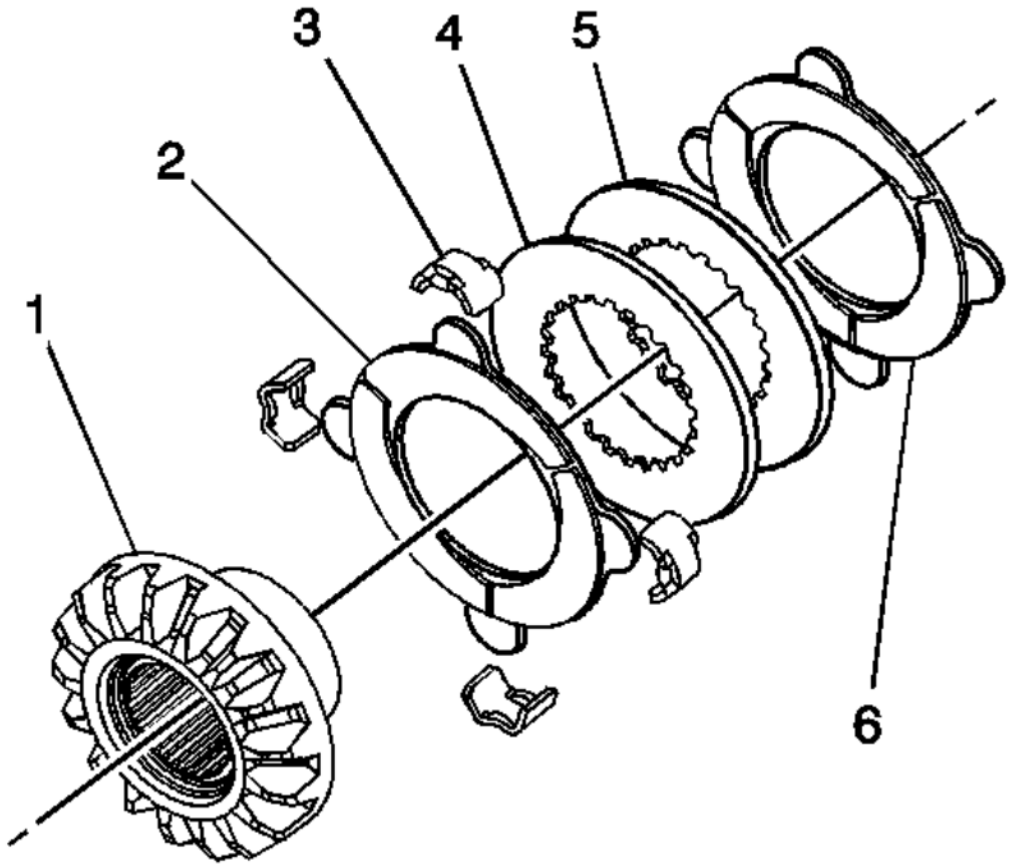


Fig. 281: View Of Locking Differential Clutch Disc Assembly (8.6 Inch Axle)

Courtesy of GENERAL MOTORS CORP.

1. Apply axle lubricant, GM P/N 12378261 (Canadian P/N 10953455) or equivalent meeting GM Specification 9986115, to the surface of each disc.
2. Assemble the right side or bell-end side clutch disc assembly as follows:
    1. Install the two-sided carbon eared disc (2) to the side gear (1).
    2. Install the 1st splined disc (4).
    3. Install the 2nd splined disc (5).
    4. Install the one-sided carbon eared disc (6).
    5. Install the guide clips (3) to the clutch discs (2, 4-6).

    Apply chassis grease, GM P/N 12377985 (Canadian P/N 88901242) or equivalent, to the guide clips in order to hold the clips in place on the disc ears.

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY ASSEMBLE (9.5 INCH AXLE)

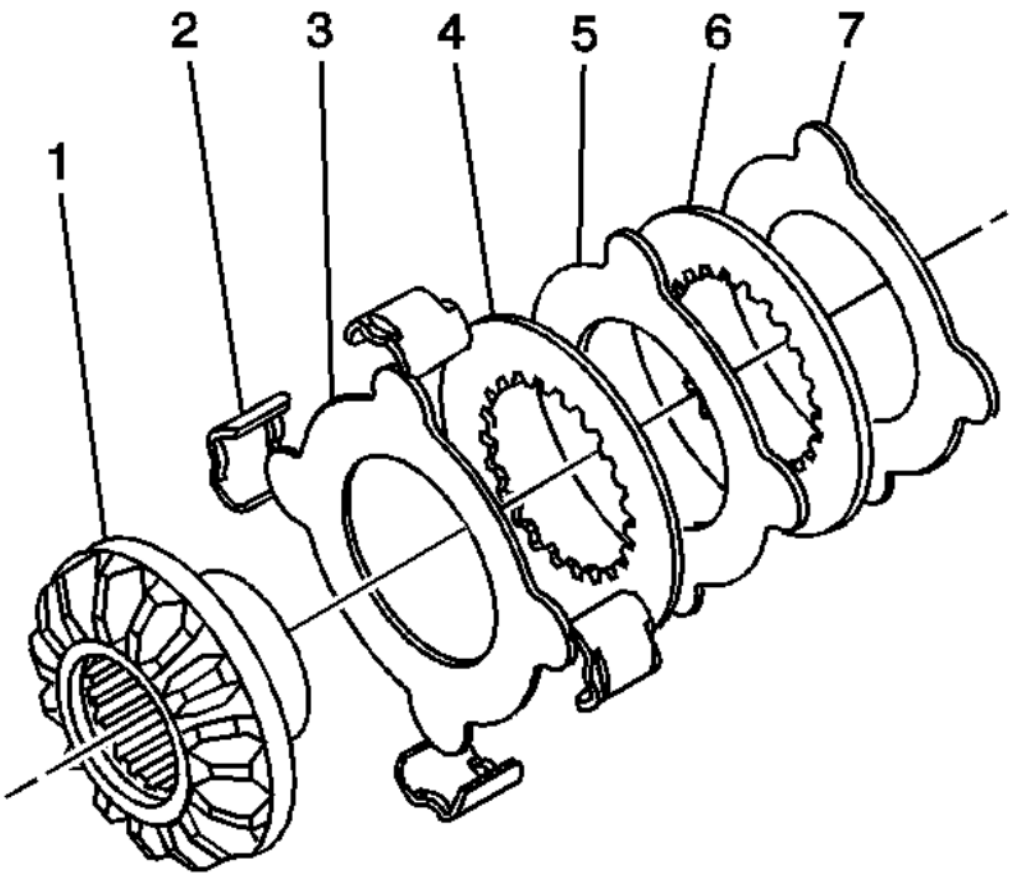


Fig. 282: View Of Locking Differential Clutch Disc Assembly (9.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

1. Apply axle lubricant, GM P/N 12378261 (Canadian P/N 10953455) or equivalent meeting GM Specification 9986115, to the surface of each disc.
2. Assemble the right side or bell-end side clutch disc assembly as follows:
    1. Install the 1st non-carbon eared disc (3) to the side gear (1).
    2. Install the 1st splined disc (4).
    3. Install the 2nd non-carbon eared disc (5).
    4. Install the 2nd splined disc (6).
    5. Install the 3rd non-carbon eared disc (7).
    6. Install the guide clips (2) to the clutch discs (2-7).

Apply chassis grease, GM P/N 12377985 (Canadian P/N 88901242) or equivalent, to the guide clips in order to hold the clips in place on the disc ears.

LOCKING DIFFERENTIAL ADJUSTMENT (8.6 INCH AXLE)

Tools Required

- **J 7872** Magnetic Base Dial Indicator. See **Special Tools**.
- **J 8001** Dial Indicator Set

Adjustment of the Differential

IMPORTANT: If it is necessary to replace the left side locking differential side gear cam unit and clutch disc assembly, the right side locking differential side gear and clutch disc assembly, or the thrust block, the entire differential must be adjusted. The differential is adjusted using selective thickness thrust washers between the clutch disc assemblies and the case and/or different selective thickness thrust blocks.

When adjusting the differential, note the following:

- Build up the clutch disc assemblies properly.

  Proper clearance between parts is critical to the operation of the unit.

- Adjust the backlash and thrust block clearance in the following order:
  1. The left side gear backlash
  2. The right side gear backlash
  3. The thrust block clearance

Left Side Gear Backlash Adjustment

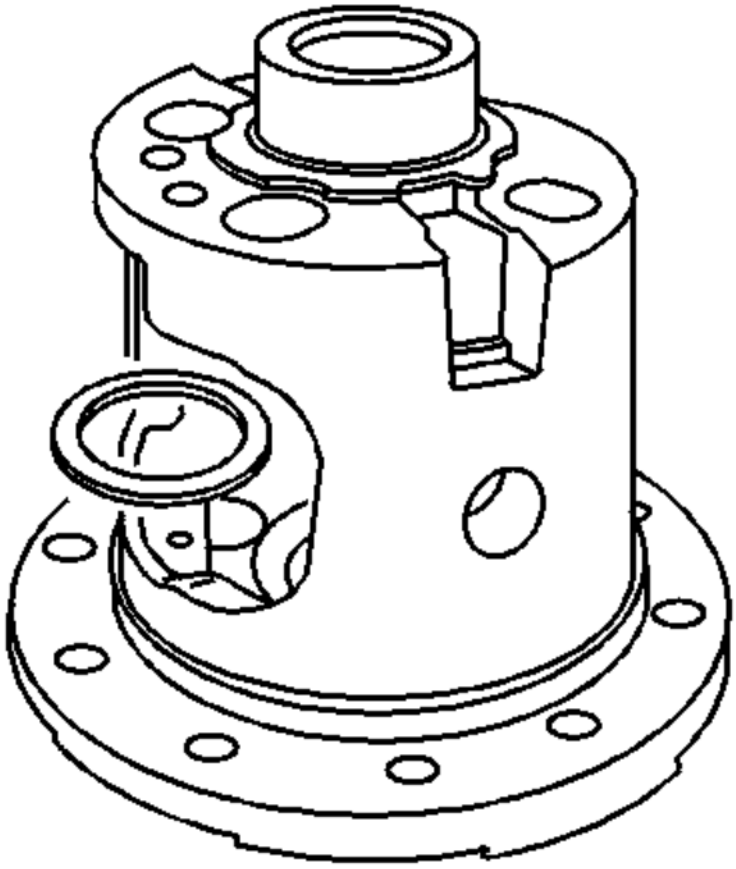


Fig. 283: View Of Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS CORP.

1. Install the new locking differential clutch disc thrust washer into the left side or flange-end of the differential case.

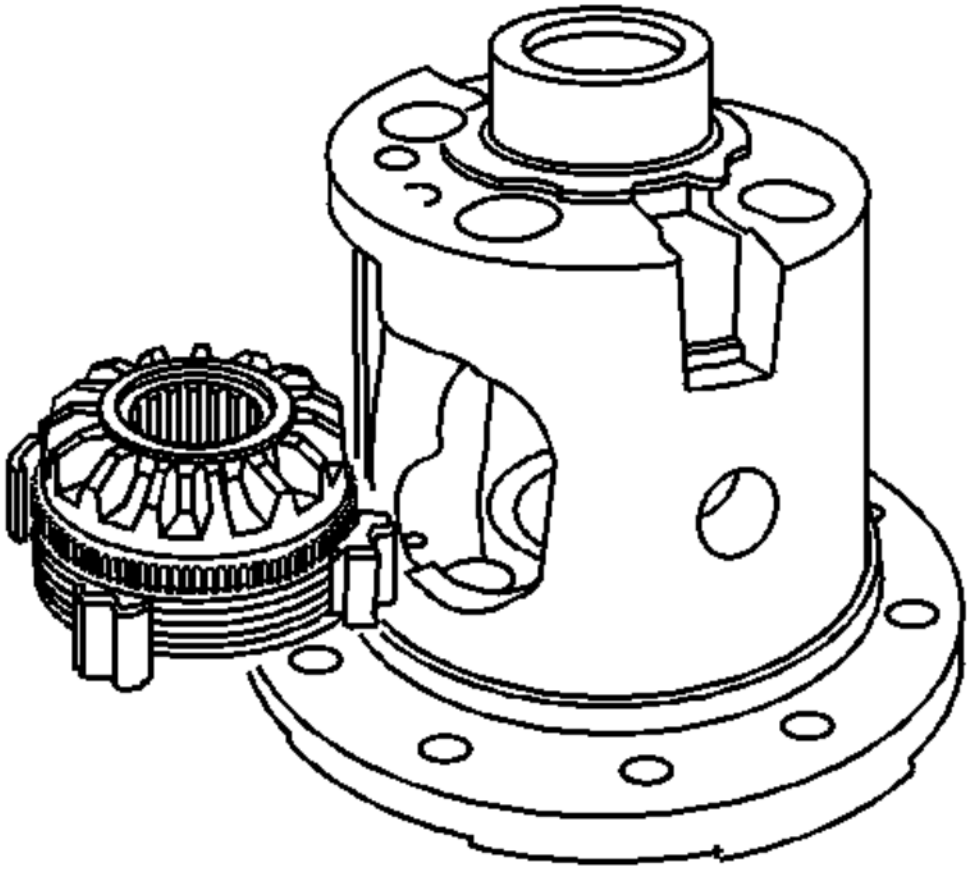


Fig. 284: View Of Left Side Gear Cam Unit & Clutch Disc Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the locking differential side gear cam unit and clutch disc assembly into the left side or flange-end of the differential case.
3. Install the differential pinion gears with the differential pinion gear thrust washers into the differential case.

   Align the openings of the differential pinion gears and the differential pinion gear thrust washer to the pinion shaft opening in the differential case.

4. Install the pinion shaft. It may be necessary to press down on the locking differential side

gear cam unit in order to align the pinion gear shaft opening with the pinion shaft opening in the differential case.

If the pinion shaft cannot be installed after pressing on the locking differential side gear cam unit, replace the locking differential clutch disc gear thrust washer with a thinner washer.

NOTE: Refer to Fastener Notice .

5. Install the pinion shaft lock bolt.

   Tighten: Tighten the pinion shaft lock bolt finger tight.

6. Rotate the pinion gear closest to the lock bolt so that one of the teeth is pointing downward, perpendicular to the ring gear flange.
7. Install a brass drift between the locking differential side gear cam unit and the pinion shaft.

   Press the brass drift in far enough in order to compress the clutch discs.

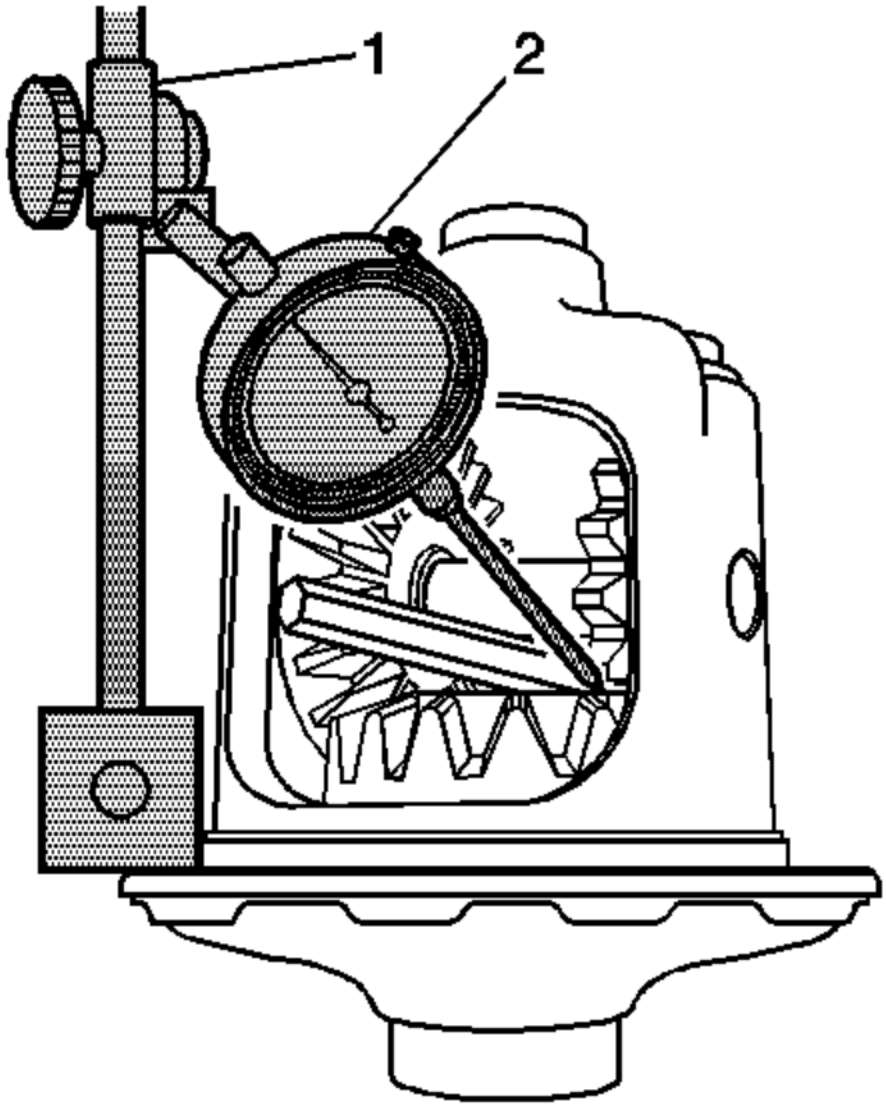


Fig. 285: Measuring Backlash Of Differential Pinion Gear & Side Gear
Courtesy of GENERAL MOTORS CORP.

8. Measure the backlash of the differential pinion gear and the locking differential side gear cam unit by doing the following:
    1. Install the **J 7872** (1) to the ring gear flange. See **Special Tools**.

2. Loosely clamp the **J 8001-3** (2) onto the stem on the **J 7872** (1). See **Special Tools**.
3. Place the contact pad of the **J 8001-3** on one of the teeth of the pinion gear closest to the pinion shaft lock bolt. See **Special Tools**.

   Turn the dial of the **J 8001-3** until the needle and the dial face indicate ZERO. See **Special Tools**.

4. Tighten the lock nut of the **J 8001-3** finger tight. See **Special Tools**.
5. Pull the pinion gear firmly into the differential case seat.
6. Rotate the pinion gear back and forth.
7. Measure the backlash.

   Specification: The backlash between the differential pinion gear and the locking differential side gear cam unit should be 0.254-0.406 mm (0.010-0.016 in).

9. If the backlash is too large, install a thicker locking differential clutch disc thrust washer and recheck the backlash.
10. If the backlash is too small, install a thinner locking differential clutch disc thrust washer and recheck the backlash.

Locking differential clutch disc thrust washers are available in the following sizes:

Washer Sizes:

- 0.559 mm (0.022 in)
- 0.686 mm (0.027 in)
- 0.813 mm (0.032 in)
- 0.914 mm (0.036 in)
- 1.016 mm (0.040 in)
- 1.118 mm (0.044 in)
- 1.219 mm (0.048 in)
- 1.321 mm (0.052 in)

Right Side Gear Backlash Adjustment

1. If necessary, remove the following from the differential case:
   1. The pinion lock shaft bolt
   2. The pinion shaft

3. The differential pinion gears
4. The differential pinion gear thrust washers
5. The left side locking differential side gear cam unit and clutch disc assembly

2. Install the differential side gear shim into the right side or bell-end of the differential case.
3. Install the locking differential side gear and clutch disc assembly into the right side or bell-end of the differential case.
4. Install the differential pinion gears with the differential pinion thrust washers into the differential case.

   Align the openings of the differential pinion gears and the differential pinion gear thrust washers to the pinion shaft opening in the differential case.

5. Press down on the locking differential side gear and install the pinion shaft.

   If the side gear cannot be pressed down far enough to install the pinion shaft, replace the side gear shim with a thinner shim.

6. Install the pinion shaft lock bolt.

   Tighten: Tighten the pinion shaft lock bolt finger tight.

7. Rotate the differential pinion gear so that one of the teeth is pointing downward, perpendicular to the ring gear flange.

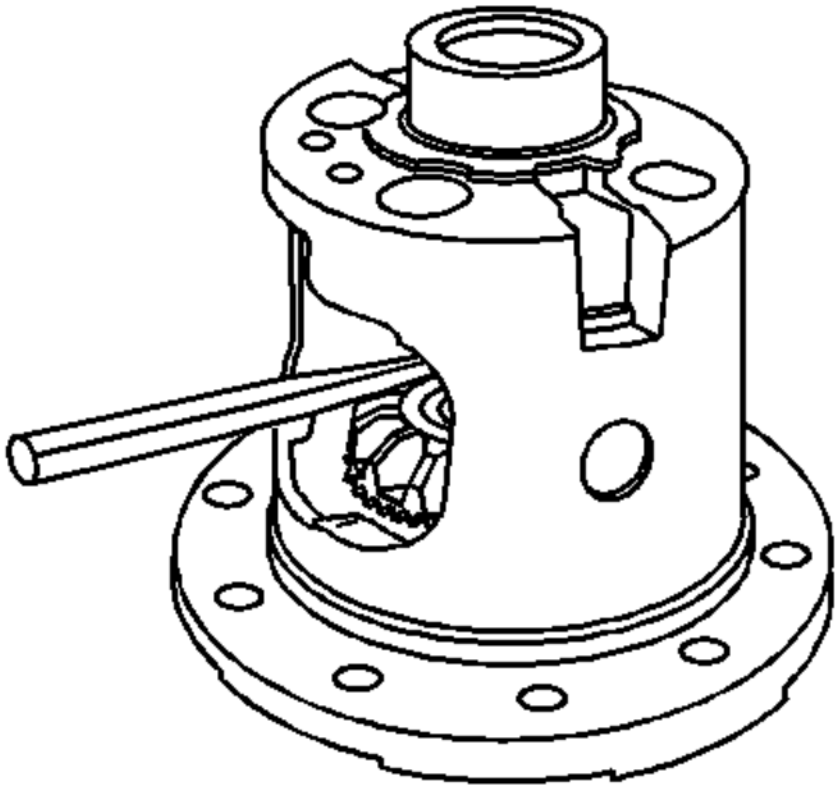


Fig. 286: Installing Brass Drift Between Locking Differential Side Gear & Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

8. Install a brass drift between the locking differential side gear and the pinion shaft.

   Press the brass drift in enough in order to compress the clutch discs.

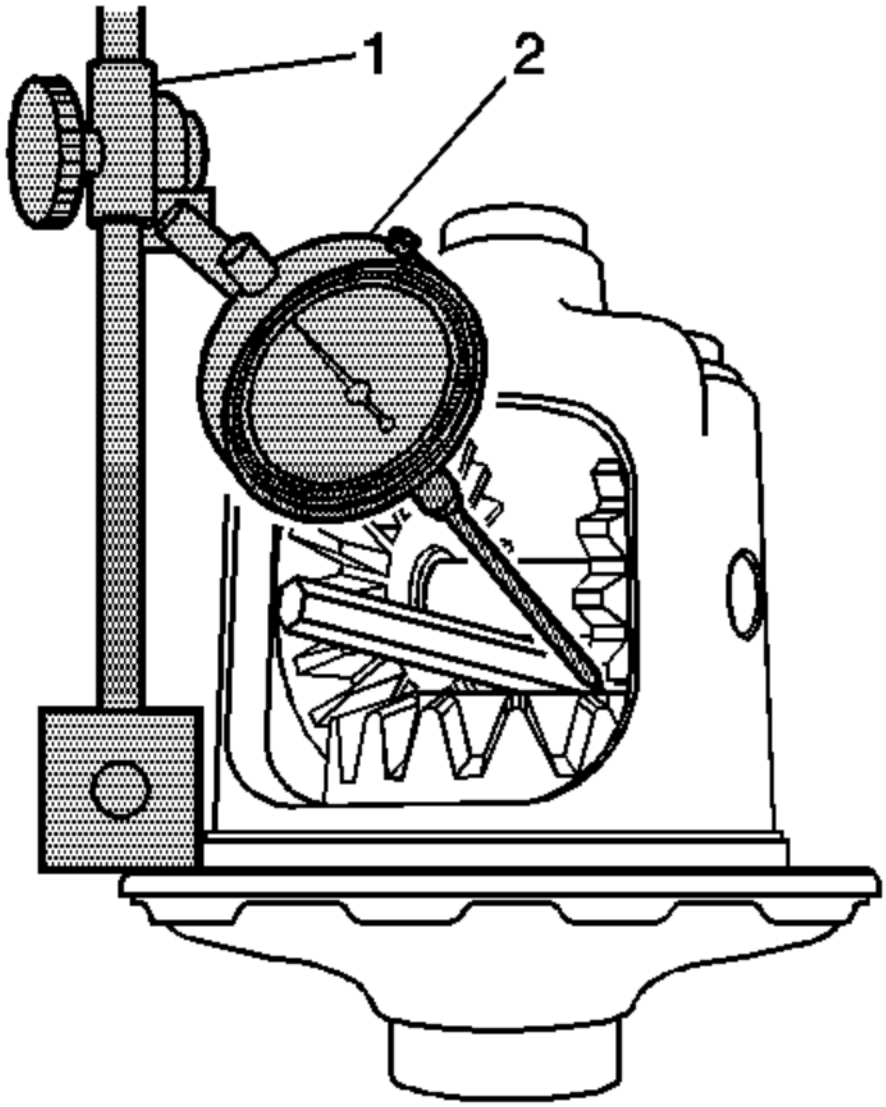


Fig. 287: Measuring Backlash Of Differential Pinion Gear & Side Gear
Courtesy of GENERAL MOTORS CORP.

9. Measure the backlash of the pinion gear and the right side gear by doing the following:
    1. Install the **J 7872** (1) to the ring gear flange. See **Special Tools**.
    2. Loosely clamp the **J 8001-3** (2) onto the stem on the **J 7872** (1). See **Special Tools**.

3. Place the contact pad of the **J 8001-3** on one of the teeth of the pinion gear closest to the pinion shaft lock bolt. See **Special Tools**.

   Turn the dial of the **J 8001-3** until the needle and the dial face indicate ZERO. See **Special Tools**.

4. Tighten the lock nut of the **J 8001-3** finger tight. See **Special Tools**.
5. Pull the pinion gear firmly into the differential case seat.
6. Rotate the pinion gear back and forth.
7. Measure the backlash.

   Specification: The backlash for the pinion gears should be 0.076-0.229 mm (0.003-0.009 in).

10. If the backlash is too large, install a thicker differential side gear shim and check the backlash.
11. If the backlash is too small, install a thinner differential side gear shim and check the backlash again.

Differential side gear shims are available in the following sizes:

Shim Sizes:

- 0.254 mm (0.010 in)
- 0.381 mm (0.015 in)
- 0.508 mm (0.020 in)
- 0.635 mm (0.025 in)
- 0.762 mm (0.030 in)
- 0.889 mm (0.035 in)
- 1.016 mm (0.040 in)
- 1.143 mm (0.045 in)

Thrust Block Clearance Adjustment

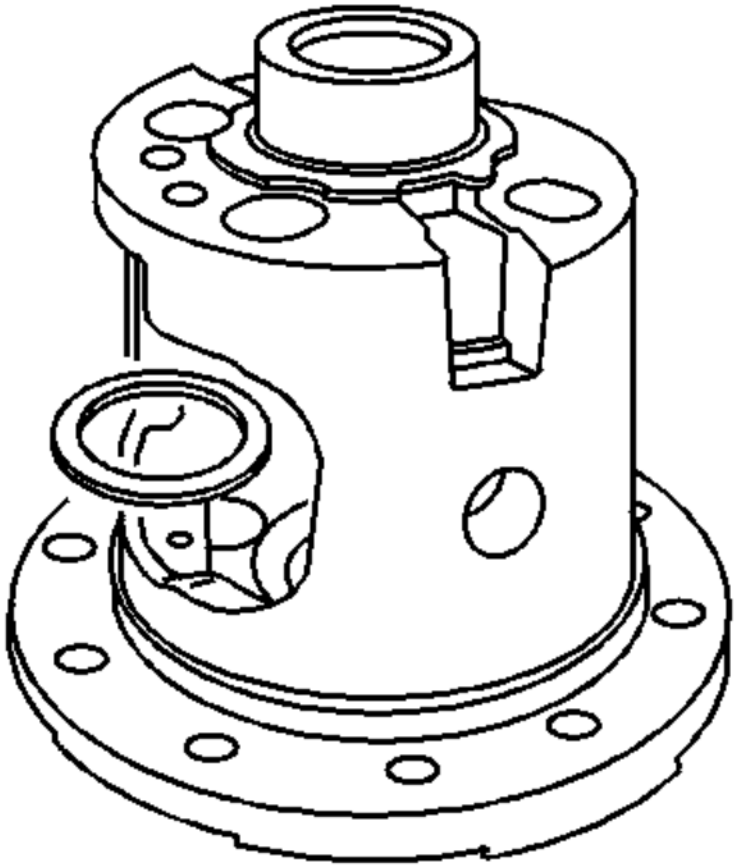


Fig. 288: View Of Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The left and right side gear backlash measurements must be done before the thrust block measurement can be completed.

1. Install the locking differential clutch disc thrust washer into the left side or flange-end of the differential case.

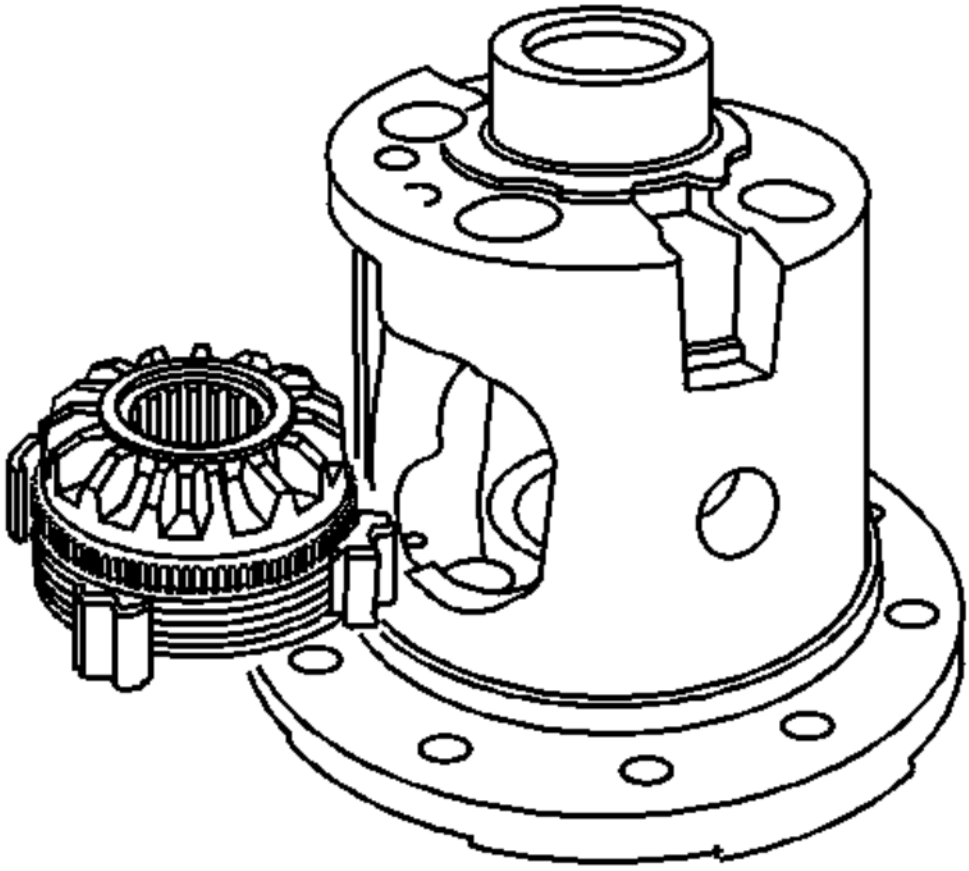


Fig. 289: View Of Left Side Gear Cam Unit & Clutch Disc Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the locking differential side gear cam unit and clutch disc assembly into the left side or flange-end of the differential case.
3. Install the differential side gear shim into the right side or bell-end of the differential case.
4. Install the locking differential side gear and clutch disc assembly into the right side or bell-end of the differential case.
5. Install the pinion shaft.
6. Install the pinion shaft bolt.

Tighten: Tighten the pinion shaft bolt finger tight.

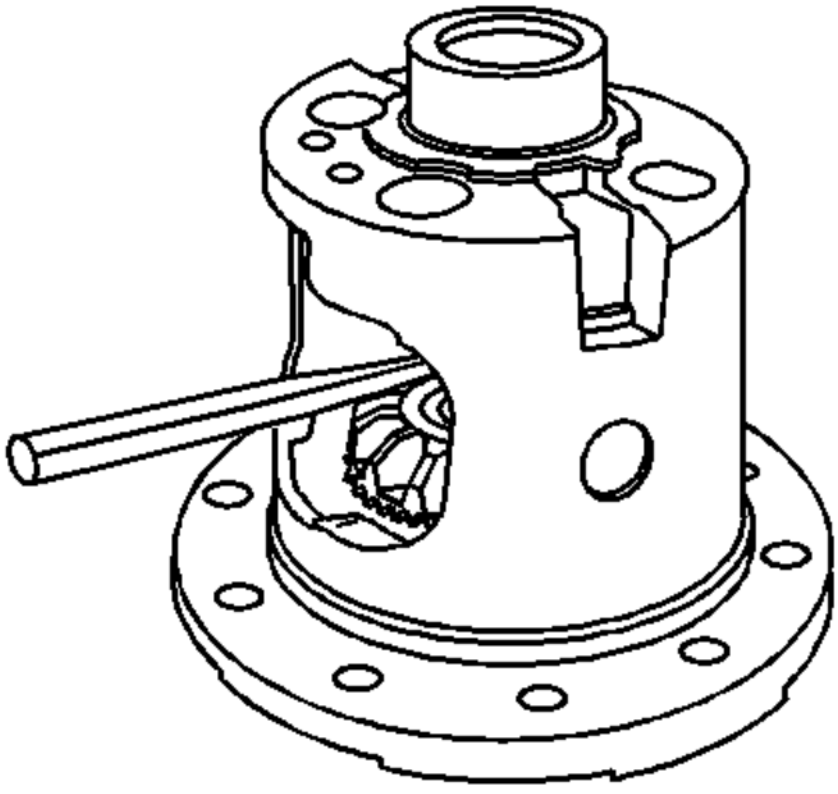


Fig. 290: Installing Brass Drift Between Locking Differential Side Gear & Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

7. Install a brass drift between the left locking differential side gear cam unit and the pinion shaft.

   Press the brass drift in far enough in order to compress the clutch disc assembly and hold the left side gear assembly in place.

8. Install a brass drift between the right side locking differential side gear and the pinion shaft.

   Press the brass drift in far enough in order to hold the right side gear assembly in place.

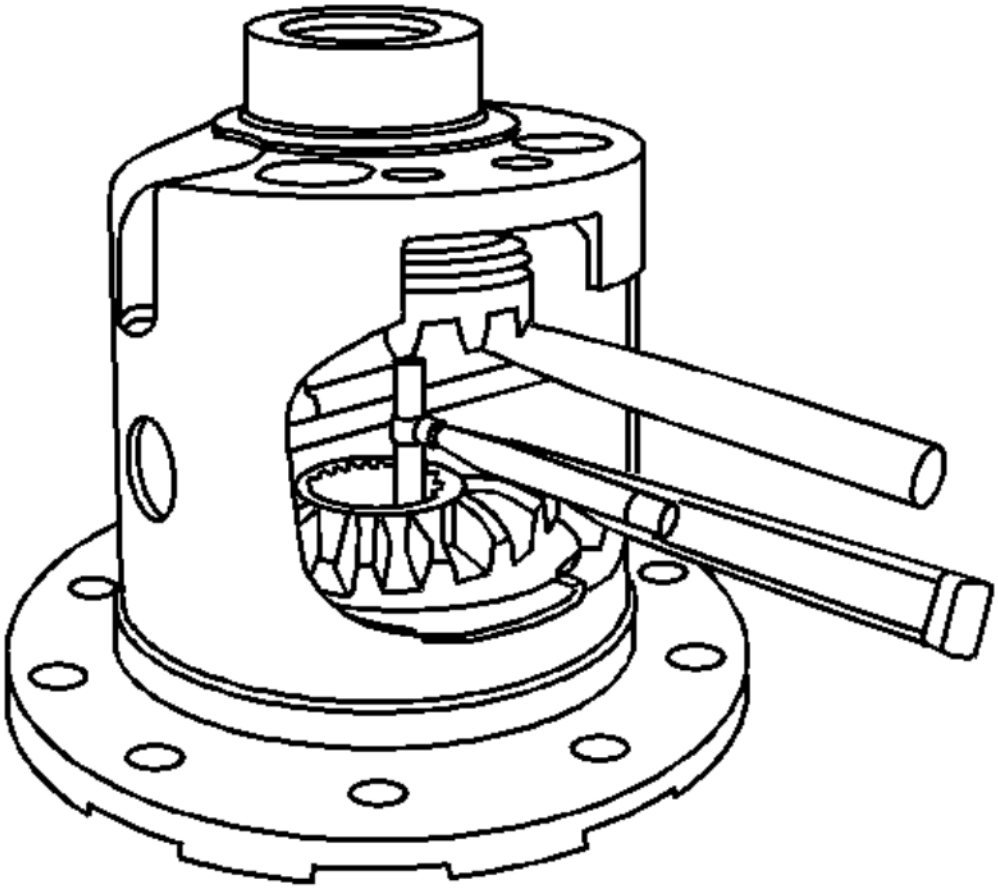


Fig. 291: Measuring Distance Between Side Gear Faces
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not measure the distance between the side gear teeth.

9. Measure the distance between the side gear faces using a 25.4-50.8 mm (1-2 in) telescoping gage.
10. Remove the telescoping gage.
11. Measure the telescoping gage with a micrometer.

    Record the measurement.

12. Compare the measurement obtained in step 11 to the thrust block sizes available. If the measurement is equal to one of the thrust blocks sizes available, then select that thrust block.
13. If the measurement obtained in step 11 is not equal to one of the thrust blocks sizes available, then select the thrust block that is smaller than the measurement.

    For example, if the measurement is 33.833 mm (1.332 in), select the 33.782 mm (1.330 in) thrust block.

IMPORTANT: The backlash must be rechecked and adjusted to specification anytime the left and/or the right thrust washers are replaced.

14. If the measurement obtained in step 11 is less than 33.578 mm (1.322 in), then reduce the left side gear thrust washer or the right side gear shim thickness in order to increase the thrust block opening.
15. If the measurement obtained in step 11 is greater than 34.290 mm (1.350 in), then increase the left side gear thrust washer or the right side gear shim thickness in order to decrease the thrust block opening.
16. Recheck the left and/or right side gear backlash and adjust as necessary.
17. Recheck the thrust block clearance and adjust as necessary.
18. Assemble the differential. Refer to **Locking Differential Assemble (9.5 Inch Axle)**.

LOCKING DIFFERENTIAL ADJUSTMENT (9.5 INCH AXLE)

Tools Required

- **J 7872** Magnetic Base Dial Indicator. See **Special Tools**.
- **J 8001** Dial Indicator Set

Adjustment of the Differential

IMPORTANT: If it is necessary to replace the left side gear cam unit and disc assembly, the right side gear and disc assembly, or the thrust block, the entire differential must be adjusted. The differential is adjusted using selective thickness thrust washers between the clutch disc assemblies and the case and/or different selective thickness thrust blocks.

When adjusting the differential, note the following:

- Build up the clutch disc assemblies properly.

  Proper clearance between parts is critical to the operation of the unit.

- Adjust the backlash and thrust block clearance in the following order:
  1. The left side gear backlash
  2. The right side gear backlash
  3. The thrust block clearance

Left Side Gear Backlash Adjustment

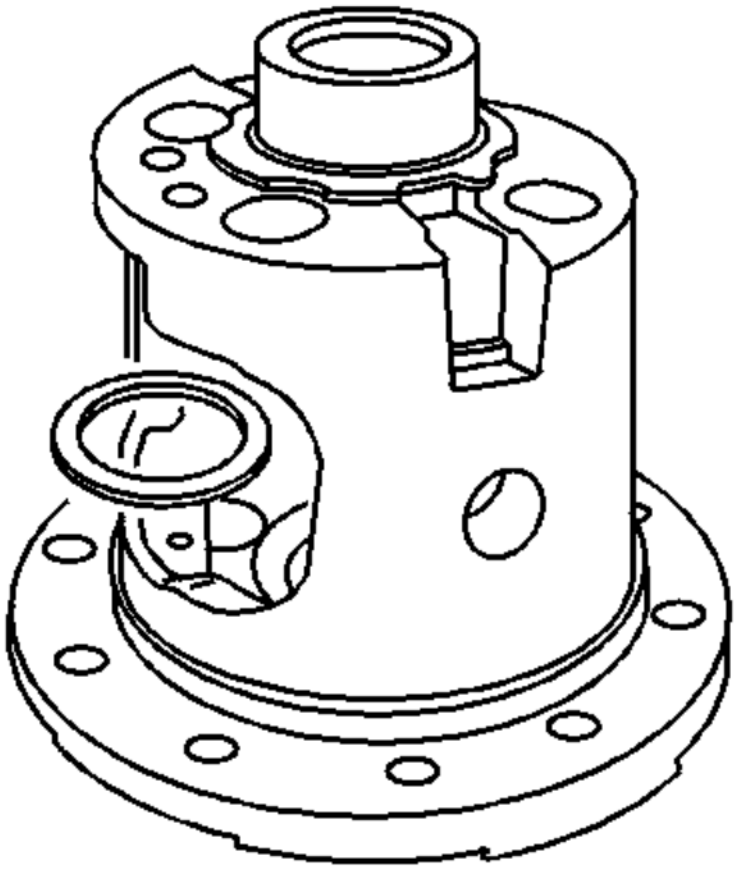


Fig. 292: View Of Left Side Gear Thrust Washer

Courtesy of GENERAL MOTORS CORP.

1. Install the new left side thrust washer into the flange-end of the differential case.

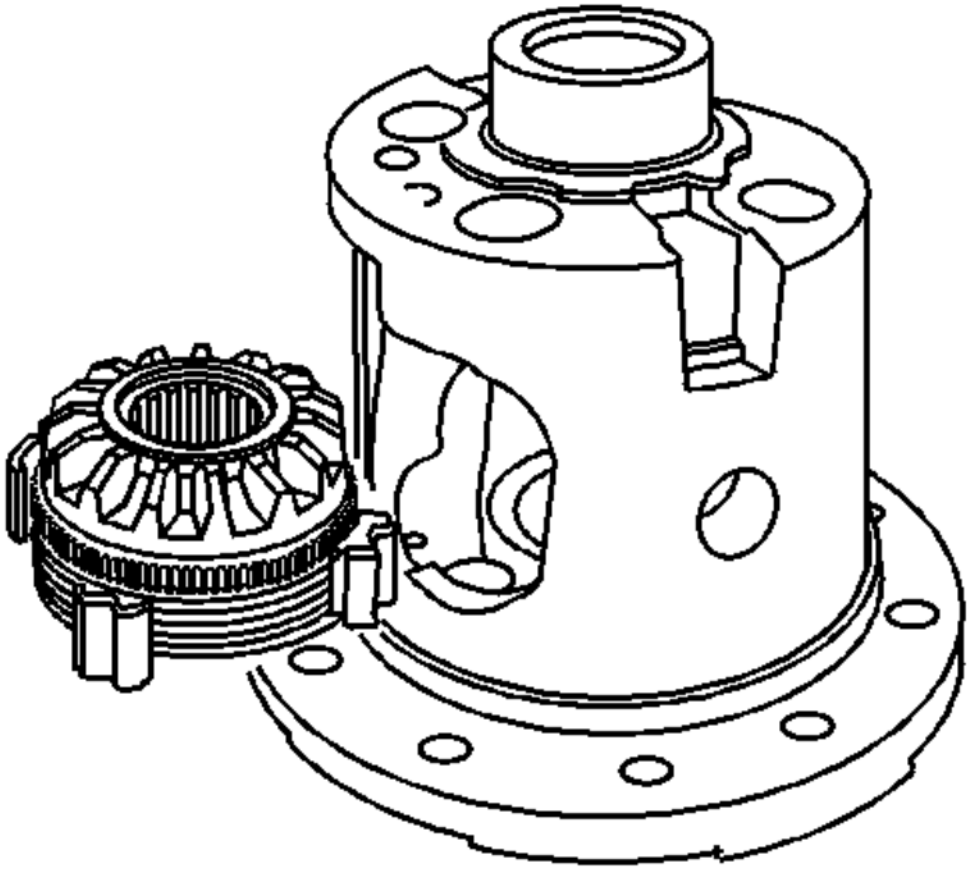


Fig. 293: View Of Left Side Gear Cam Unit & Clutch Disc Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the left side locking differential side gear cam unit and clutch disc assembly into the differential case.
3. Install the differential pinion gears with the deferential pinion gear thrust washers into the differential case.

Align the openings of the differential pinion gears and the differential pinion gear thrust

washers to the pinion shaft opening in the differential case.

4. Install the pinion shaft. It may be necessary to press down on the side gear in order to align the pinion gear shaft opening with the pinion shaft opening in the differential case.

   If the pinion shaft cannot be installed after pressing on the side gear, replace the locking differential clutch disc thrust washer with a thinner washer.

   NOTE: Refer to Fastener Notice .

5. Install the pinion shaft lock bolt.

   Tighten: Tighten the pinion shaft lock bolt finger tight.

6. Rotate the pinion gear closest to the lock bolt so that one of the teeth is pointing downward, perpendicular to the ring gear flange.
7. Install a brass drift between the side gear and the pinion shaft.

   Press the brass drift in far enough in order to compress the clutch discs.

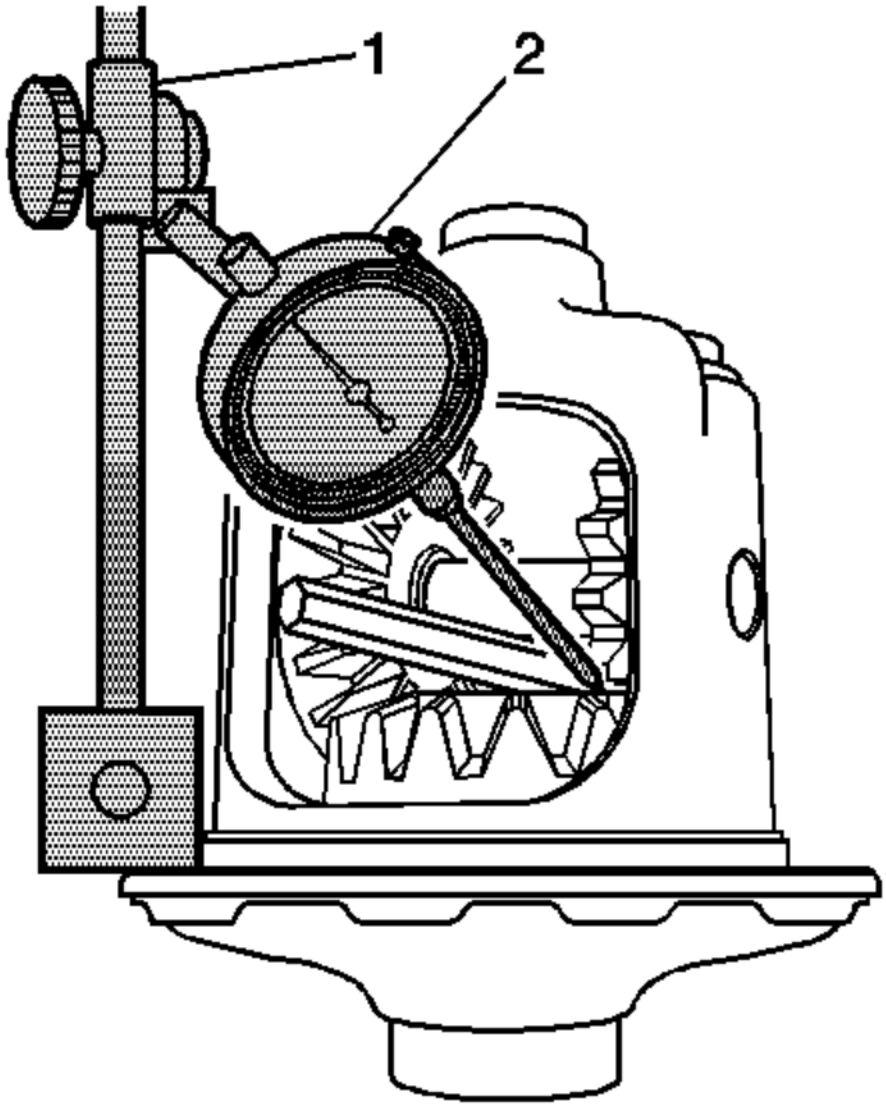


Fig. 294: Measuring Backlash Of Differential Pinion Gear & Side Gear
Courtesy of GENERAL MOTORS CORP.

8. Measure the backlash of the pinion gear and the side gear by doing the following:
    1. Install the **J 7872** (1) to the ring gear flange. See **Special Tools**.
    2. Loosely clamp the **J 8001-3** (2) onto the stem on the **J 7872** (1). See **Special Tools**.

3. Place the contact pad of the **J 8001-3** on one of the teeth of the pinion gear closest to the pinion shaft lock bolt. See **Special Tools**.

   Turn the dial of the **J 8001-3** until the needle and the dial face indicate ZERO. See **Special Tools**.

4. Tighten the lock nut of the **J 8001-3** finger tight. See **Special Tools**.
5. Pull the pinion gear firmly into the differential case seat.
6. Rotate the pinion gear back and forth.
7. Measure the backlash.

   Specification: The backlash between the differential pinion gears and the locking differential side gear cam unit should be 0.279-0.432 mm (0.011-0.017 in).

9. If the backlash is too large, install a thicker locking differential clutch disc thrust washer and recheck the backlash.
10. If the backlash is too small, install a thinner locking deferential clutch disc thrust washer and recheck the backlash.

Locking differential clutch disc thrust washers are available in the following sizes:

Washer Sizes:

- 0.559 mm (0.022 in)
- 0.686 mm (0.027 in)
- 0.813 mm (0.032 in)
- 0.914 mm (0.036 in)
- 1.016 mm (0.040 in)
- 1.118 mm (0.044 in)
- 1.219 mm (0.048 in)
- 1.321 mm (0.052 in)

Right Side Gear Backlash Adjustment

1. If necessary, remove the following from the differential case:
   1. The pinion lock shaft bolt
   2. The pinion shaft
   3. The differential pinion gears

4. The differential pinion gear thrust washers
5. The locking differential side gear cam unit and clutch disc assembly

2. Install the right side differential side gear shim into the bell-end of the differential case.
3. Install the clutch disc assembly into the differential case.
4. Install the locking differential side gear.
5. Install the differential pinion gears with the differential pinion thrust washers into the differential case.

   Align the openings of the differential pinion gears and the differential pinion thrust washer to the pinion shaft opening in the differential case.

6. Press down on the locking differential side gear and install the pinion shaft.

   If the side gear cannot be pressed down far enough to install the pinion shaft, replace the differential side gear shim with a thinner shim.

7. Install the pinion shaft lock bolt.

   Tighten: Tighten the pinion shaft lock bolt finger tight.

8. Rotate the differential pinion gear so that one of the teeth is pointing downward, perpendicular to the ring gear flange.

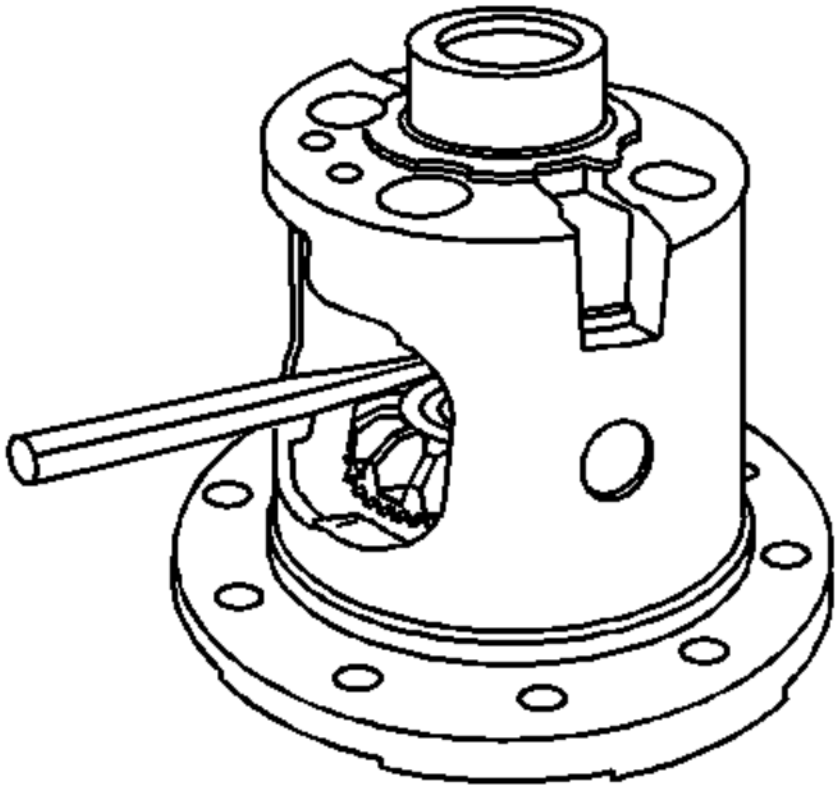


Fig. 295: Installing Brass Drift Between Locking Differential Side Gear & Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

9. Install a brass drift between the differential side gear and the pinion shaft.

   Press the brass drift in enough in order to compress the clutch discs.

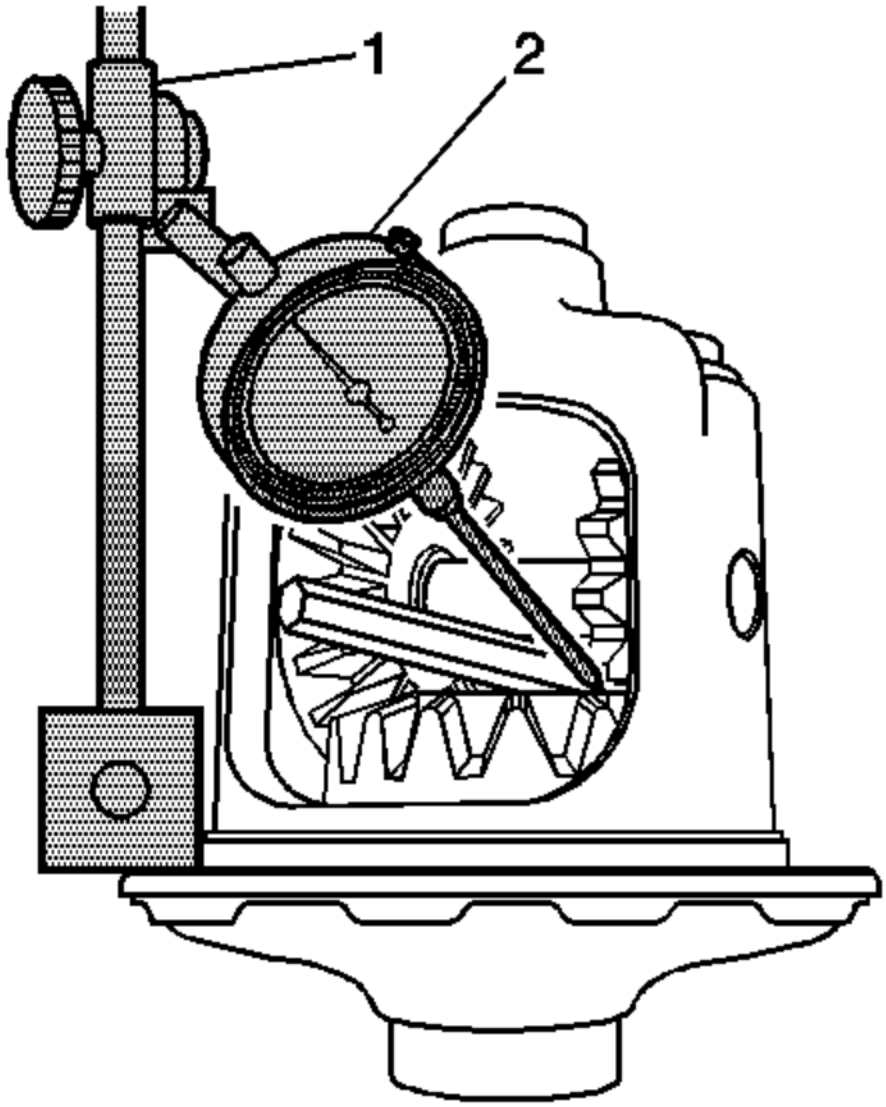


Fig. 296: Measuring Backlash Of Differential Pinion Gear & Side Gear
Courtesy of GENERAL MOTORS CORP.

10. Measure the backlash of the differential pinion gear and the locking differential side gear by doing the following:
    1. Install the **J 7872** (1) to the ring gear flange. See **Special Tools**.

2. Loosely clamp the **J 8001-3** (2) onto the stem on the **J 7872** (1). See **Special Tools**.
3. Place the contact pad of the **J 8001-3** on one of the teeth of the pinion gear closest to the pinion shaft lock bolt. See **Special Tools**.

   Turn the dial of the **J 8001-3** until the needle and the dial face indicate ZERO. See **Special Tools**.

4. Tighten the lock nut of the **J 8001-3** finger tight. See **Special Tools**.
5. Pull the pinion gear firmly into the differential case seat.
6. Rotate the pinion gear back and forth.
7. Measure the backlash.

   Specification: The backlash between the differential pinion gear and the locking differential side gear should be 0.051-0.203 mm (0.002-0.008 in).

11. If the backlash is too large, install a thicker locking differential clutch disc thrust washer and recheck the backlash.
12. If the backlash is too small, install a thinner locking differential clutch disc thrust washer and recheck the backlash.

Differential side gear shims are available in the following sizes:

Shim Sizes:

- 0.254 mm (0.010 in)
- 0.381 mm (0.015 in)
- 0.508 mm (0.020 in)
- 0.635 mm (0.025 in)
- 0.762 mm (0.030 in)
- 0.899 mm (0.035 in)
- 1.016 mm (0.040 in)
- 1.143 mm (0.045 in)
- 1.270 mm (0.050 in)
- 1.397 mm (0.055 in)
- 1.524 mm (0.060 in)

Thrust Block Clearance Adjustment

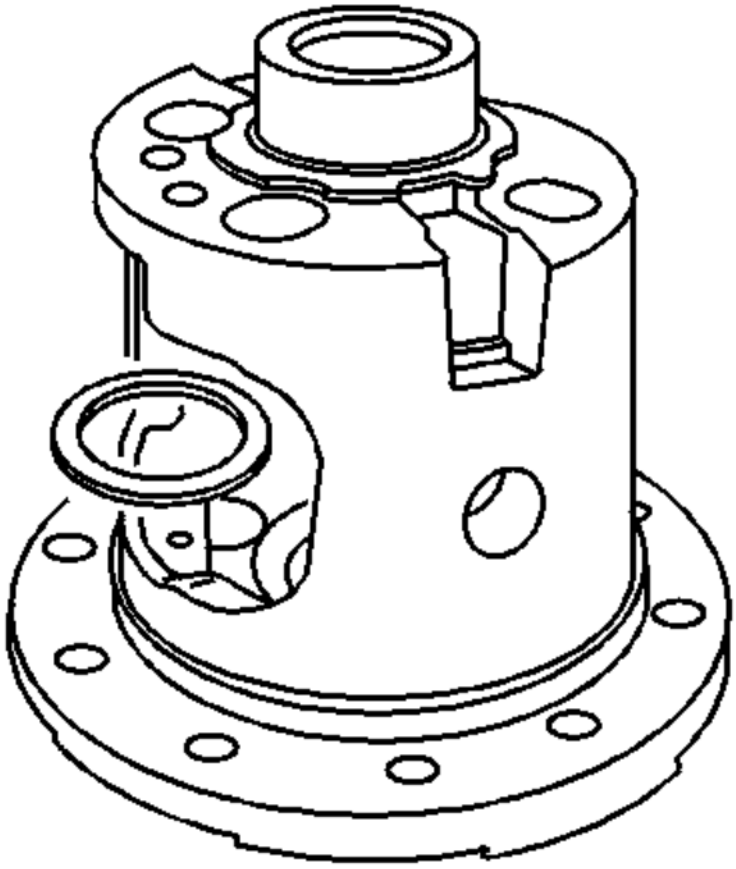


Fig. 297: View Of Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The left and right side gear backlash measurements must be done before the thrust block measurement can be completed.

1. Install the locking differential side gear thrust washer into the differential case.

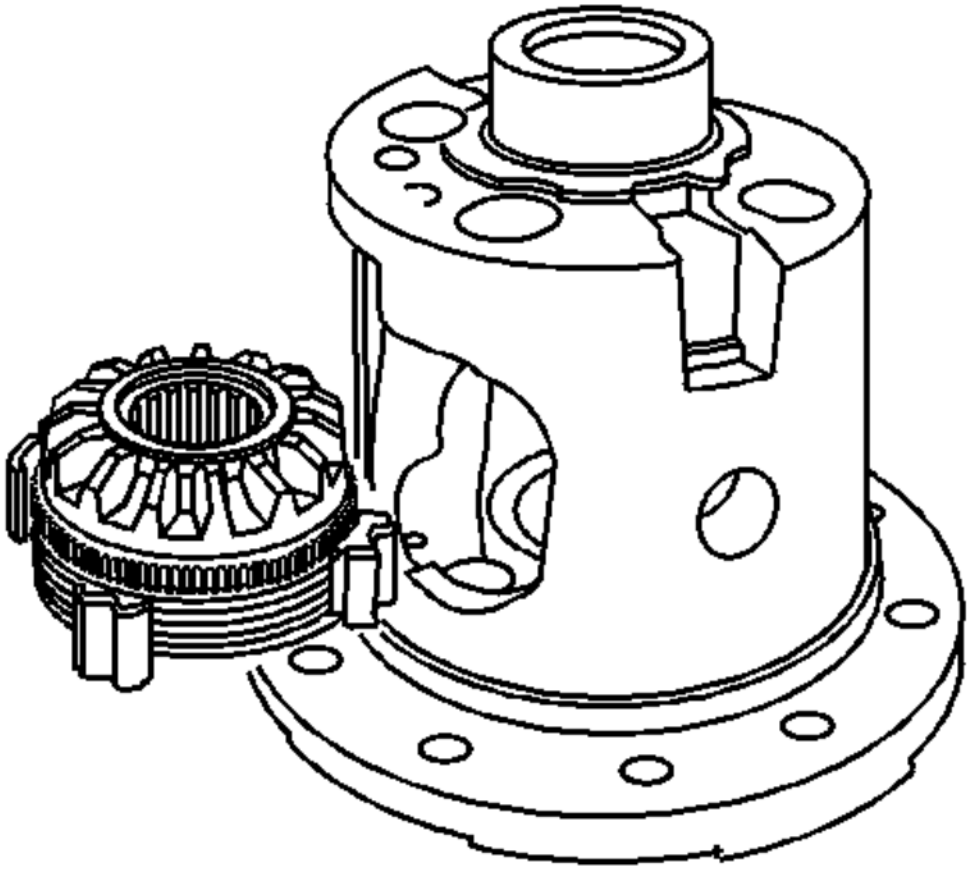


Fig. 298: View Of Left Side Gear Cam Unit & Clutch Disc Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the left side locking differential side gear cam unit and clutch disc assembly into the differential case.
3. Install the right side differential side gear shim into the differential case.
4. Install the right side locking differential side gear and clutch disc assembly into the differential case.
5. Install the pinion shaft.
6. Install the pinion shaft bolt.

Tighten: Tighten the pinion shaft bolt finger tight.

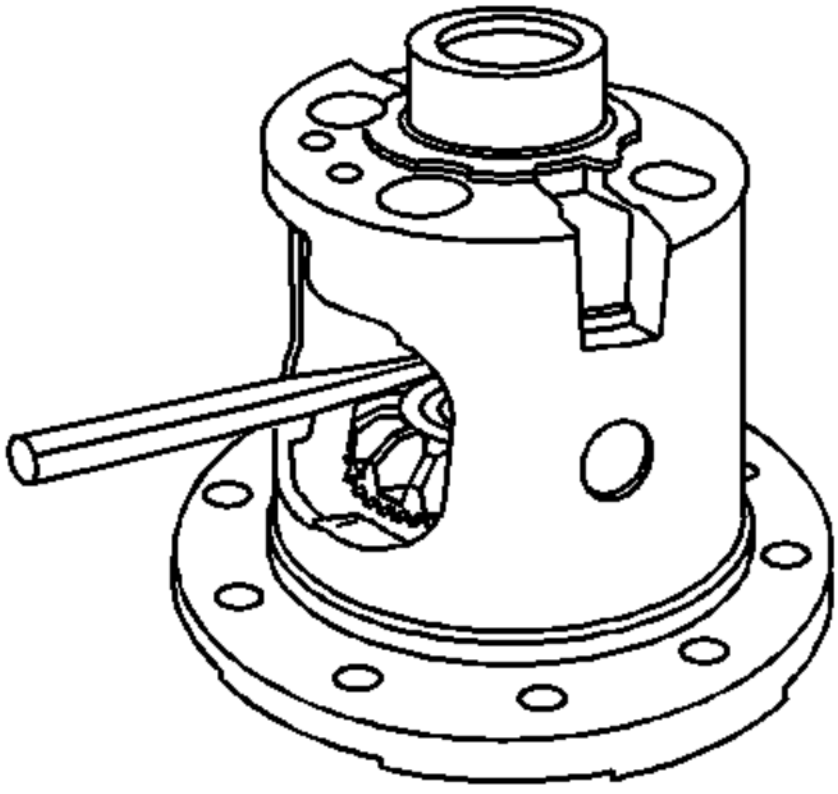


Fig. 299: Installing Brass Drift Between Locking Differential Side Gear & Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

7. Install a brass drift between the left side gear and the pinion shaft.

   Press the brass drift in far enough in order to compress the clutch disc assembly and hold the left side gear assembly in place.

8. Install a brass drift between the right side gear and the pinion shaft.

   Press the brass drift in far enough in order to hold the right side gear assembly in place.

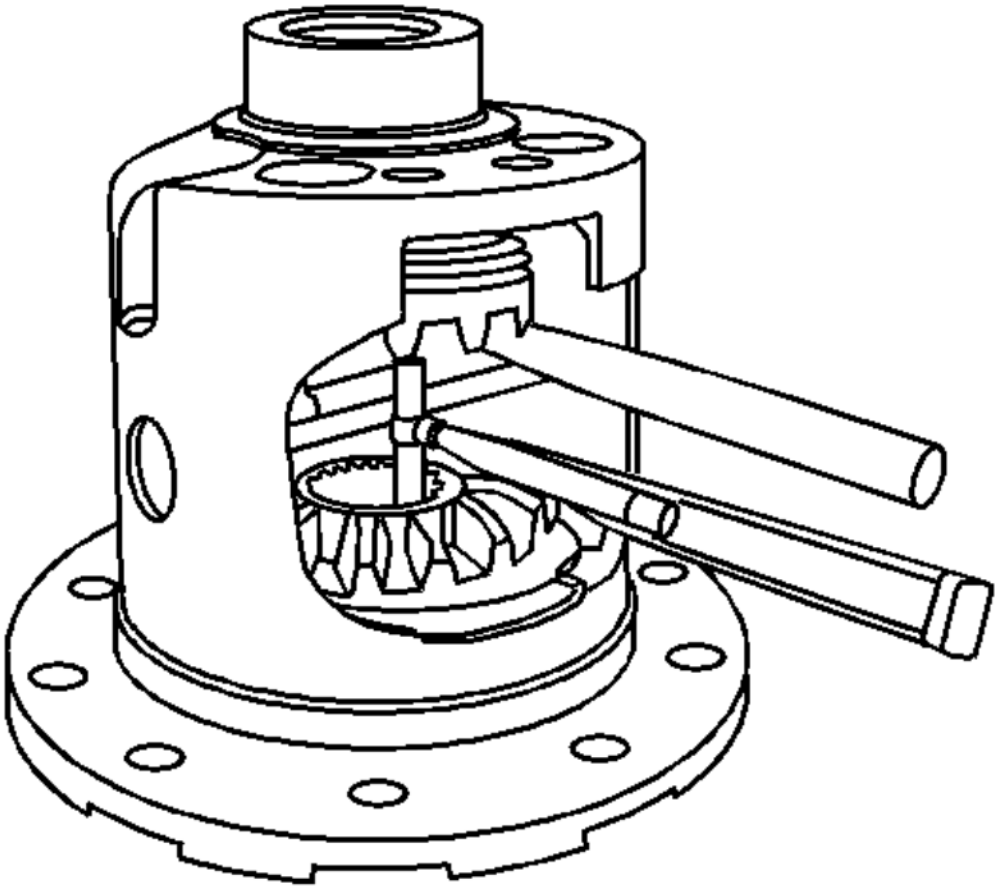


Fig. 300: Measuring Distance Between Side Gear Faces
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not measure the distance between the side gear teeth.

9. Measure the distance between the side gear faces using a 25.4-50.8 mm (1-2 in) telescoping gage.
10. Remove the telescoping gage.
11. Measure the telescoping gage with a micrometer.

    Record the measurement.

12. Compare the measurement obtained in step 11 to the thrust block sizes available. If the measurement is equal to one of the thrust blocks sizes available, then select that thrust block.
13. If the measurement obtained in step 11 is not equal to one of the thrust blocks sizes available, then select the thrust block that is smaller than the measurement.

    For example, if the measurement is 40.869 mm (1.609 in), select the 40.792 mm (1.606 in) thrust block.

IMPORTANT: The backlash must be rechecked and adjusted to specification anytime the left and/or the right thrust washers are replaced.

14. If the measurement obtained in step 11 is less than 40.488 mm (1.594 in), then reduce the left side gear thrust washer or the right side gear shim thickness in order to increase the thrust block opening.
15. If the measurement obtained in step 11 is greater than 41.120 mm (1.622 in), then increase the left side gear thrust washer or the right side gear shim thickness in order to decrease the thrust block opening.
16. Recheck the left and/or right side gear backlash and adjust as necessary.
17. Recheck the thrust block clearance and adjust as necessary.

LOCKING DIFFERENTIAL ASSEMBLE (9.5 INCH AXLE)

IMPORTANT: The left and right side gear backlash and thrust block thickness measurement must be completed before the components of the locking differential can be assembled.

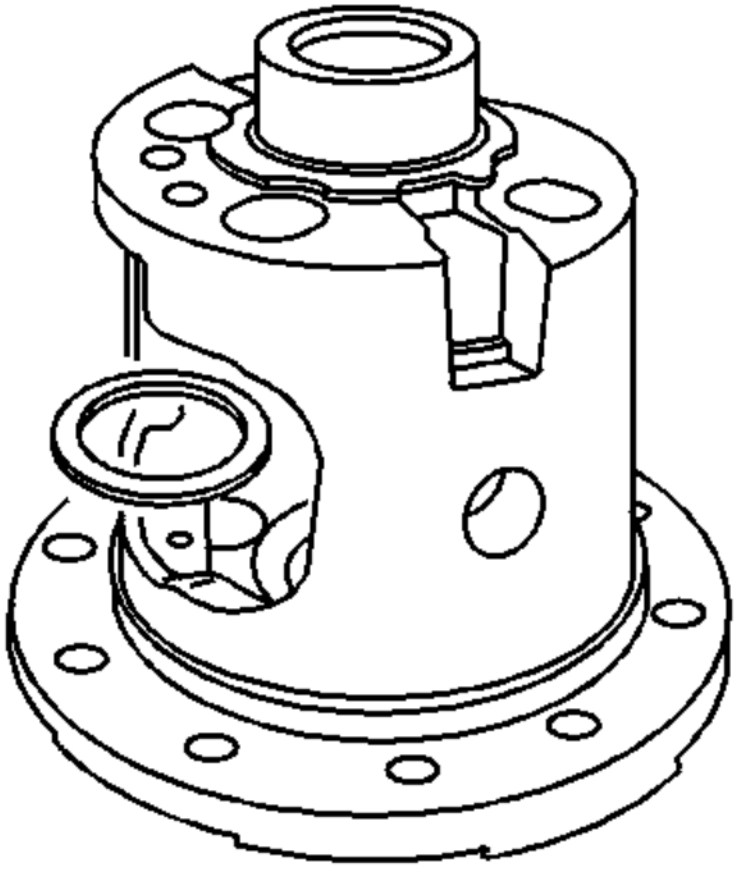


Fig. 301: View Of Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS CORP.

1. Install the left side gear thrust washer.

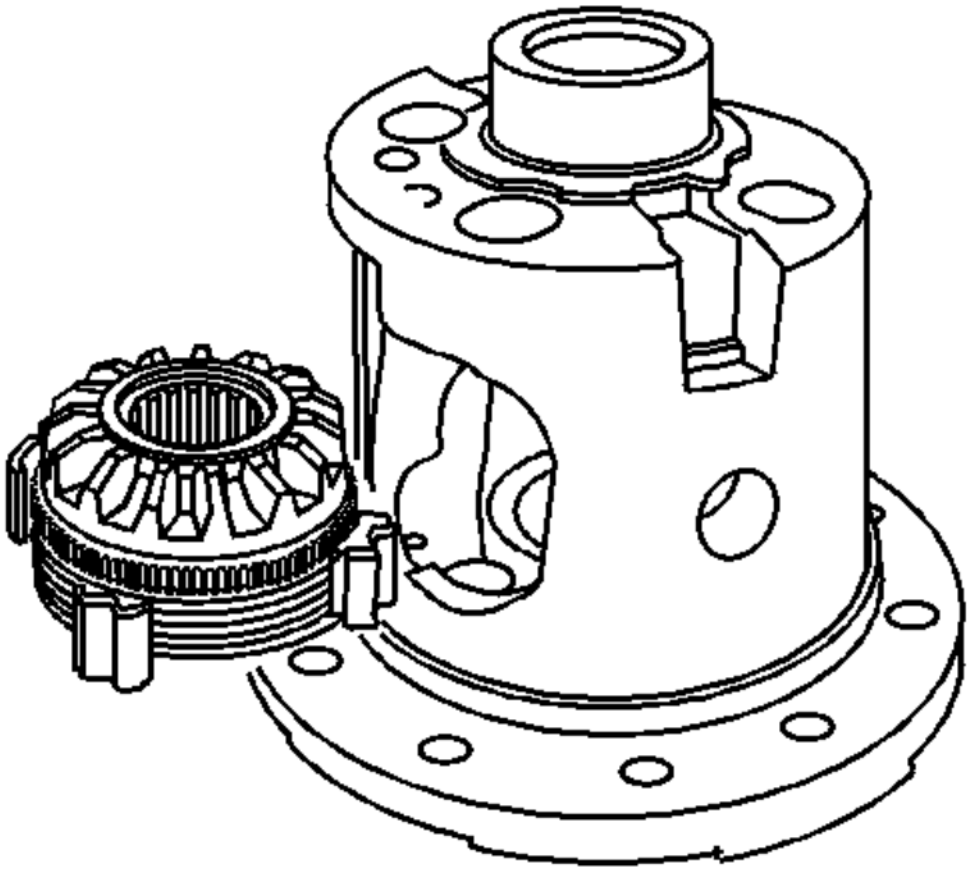


Fig. 302: View Of Left Side Gear Cam Unit & Clutch Disc Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the left side gear cam unit and clutch disc assembly.
3. Install the right side gear thrust washer.
4. Install the right side clutch disc assembly.
5. Install the right side gear.

IMPORTANT: If the original pinion gears and thrust washers are being re-used, install the pinion gears and thrust washers on the same side as when removed.

6. Install the pinion gear and the pinion thrust washers.

   Place the pinion gears and the pinion thrust washers 180 degrees apart.

7. Rotate the pinion gears and the pinion thrust washers 90 degrees and align the pinion gears with the pinion shaft opening in the differential case.
8. Install the thrust block.

   The open side of the thrust block must face the window opening.

9. Install the pinion shaft.
10. Install the new pinion shaft lock bolt.

NOTE: Refer to Fastener Notice

Tighten: Tighten the pinion shaft lock bolt finger tight.

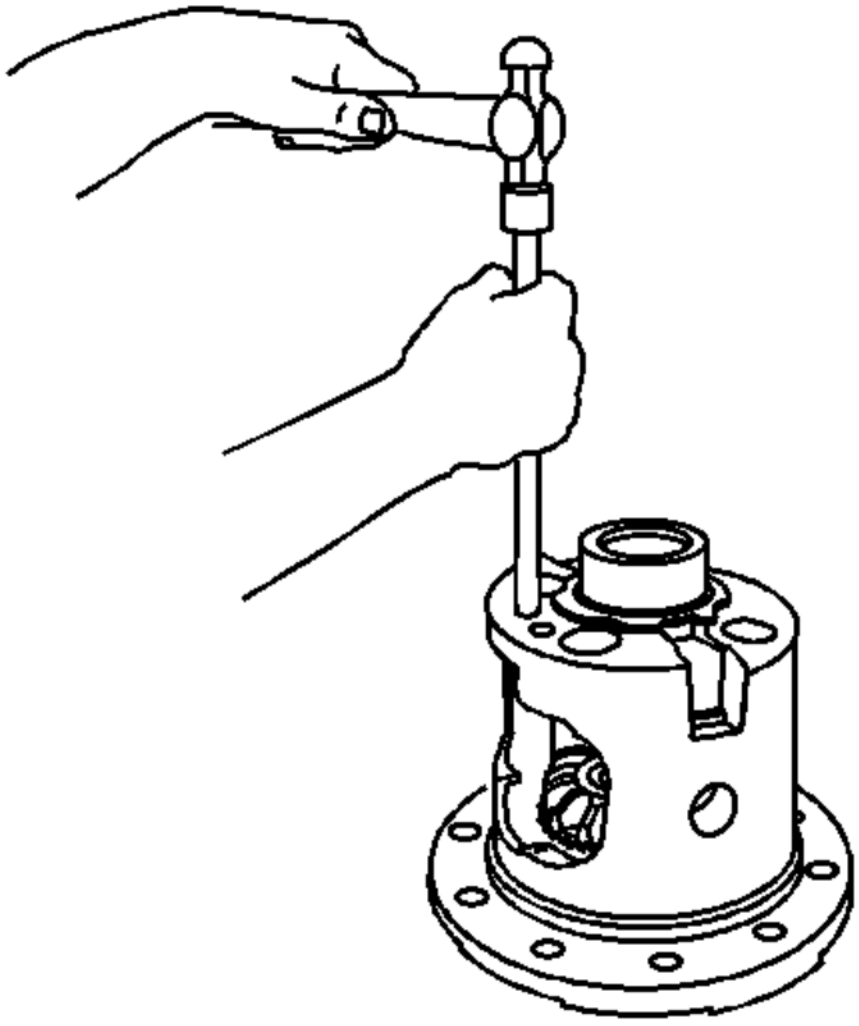


Fig. 303: Installing Governor Assembly
Courtesy of GENERAL MOTORS CORP.

11. Install the governor assembly.
12. Install the governor bushing using a hammer and a brass drift.

Specification: Press the bushing into place until there is 0.25-1.27 mm (0.010-0.050 in) of shaft end play.

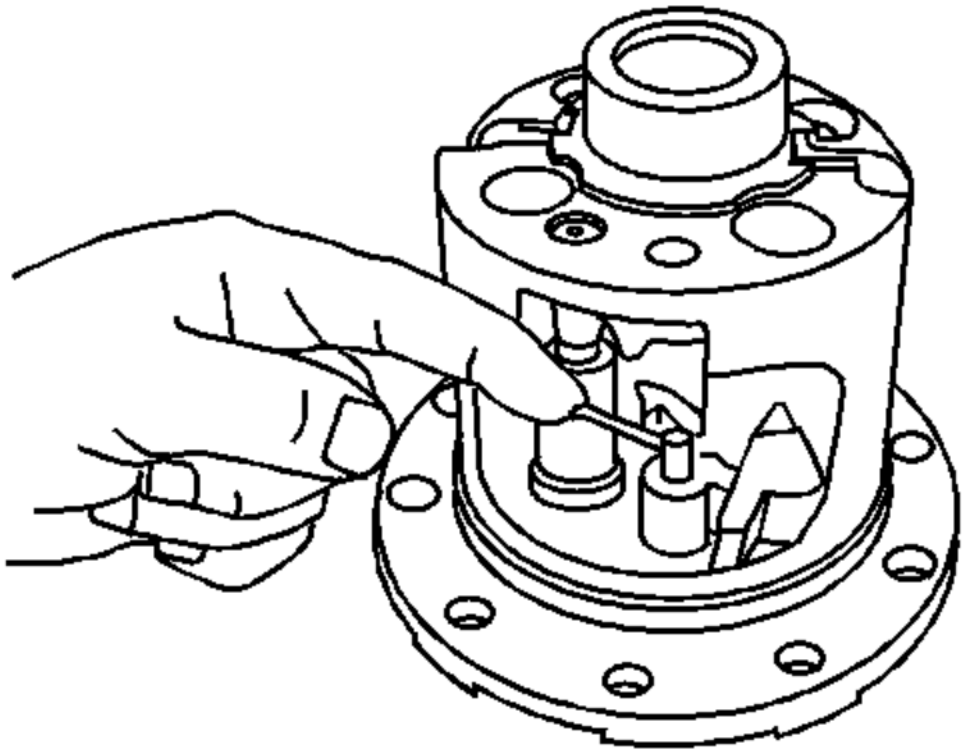


Fig. 304: Identifying Latching Bracket Bushing
Courtesy of GENERAL MOTORS CORP.

13. Install the latching bracket assembly.

    The straight end of the latching bracket spring must be over and outside the governor assembly shaft.

14. Install the latching bracket bushing using a hammer and a brass drift.

    Specification: Press the bushing into place until there is 0.000-0.051 mm (0.000-0.002 in) of shaft end play.

15. Tighten the pinion shaft lock bolt.

    Tighten:

- For the 8.6 inch axle, tighten the pinion shaft lock bolt to 36 N.m (27 lb ft).
- For the 9.5 inch axle, tighten the pinion shaft lock bolt to 50 N.m (37 lb ft).

16. Install the ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6, 9.5/9.5LD, and 11.5 Inch Axles)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

DESCRIPTION AND OPERATION

LOCKING DIFFERENTIAL DESCRIPTION AND OPERATION

The locking differential consists of the following components:

- Differential case - 1 or 2 piece
- Locking differential spider - 2 piece case only
- Pinion gear shaft - 1 piece case only
- Differential pinion gear shaft lock bolt - 1 piece case only
- Two clutch discs sets
- Locking differential side gear
- Thrust block
- Locking differential clutch disc guides
- Differential side gear shim
- Locking differential clutch disc thrust washer
- Locking differential governor
- Latching bracket
- Cam plate assembly
- Differential pinion gears
- Differential pinion gear thrust washers

The optional locking differential (RPO G80) enhances the traction capability of the rear axle by combining the characteristics of a limited-slip differential and the ability of the axle shafts to "lock" together when uneven traction surfaces exist. The differential accomplishes this in 2 ways. First by having a series of clutch plates at each side of the differential case to limit the amount of slippage between each wheel. Second, by using a mechanical locking mechanism to stop the rotation of the right differential side gear, in order to transfer the rotating torque of the wheel without traction to the wheel with traction. Each of these functions occur under different conditions.

Limited-Slip Function

Under normal conditions, when the differential is not locked, a small amount of limited-slip action occurs. The gear separating force developed in the right-hand clutch pack is primarily responsible for this.

The operation of how the limited-slip function of the unit works can be explained when the vehicle makes a right-hand turn. Since the left wheel travels farther than the right wheel, it must rotate faster than the ring gear and differential case assembly. This results in the left axle and left side gear rotating faster than the differential case. The faster rotation of the left-side gear causes the pinion gears to rotate on the pinion shaft. This causes the right-side gear to rotate slower than the differential case.

Although the side gear spreading force produced by the pinion gears compresses the clutch packs, primarily the right side, the friction between the tires and the road surface is sufficient to overcome the friction of the clutch packs. This prevents the side gears from being held to the differential case.

Locking Function

Locking action occurs through the use of some special parts:

- A governor mechanism with 2 flyweights
- A latching bracket
- The left side cam plate and cam side gear

When the wheel-to-wheel speed difference is 100 RPM or more, the flyweights of the governor will fling out and one of them will contact an edge of the latching bracket. This happens because the left cam side gear and cam plate are rotating at a speed different, either slower or faster, than that of the ring gear and differential case assembly. The cam plate has teeth on its outer diameter surface in mesh with teeth on the shaft of the governor.

As the side gear rotates at a speed different than that of the differential case, the shaft of the governor rotates with enough speed to force the flyweights outward against spring tension. One of the flyweights catches its edge on the closest edge of the latching bracket, which is stationary in the differential case. This latching process triggers a chain of events.

When the governor latches, it stops rotating. A small friction clutch inside the governor allows rotation, with resistance, of the governor shaft while one flyweight is held to the differential case through the latching bracket. The purpose of the governor's latching action is to slow the rotation of the cam plate as compared to the cam side gear. This will cause the cam plate to move out of

its detent position.

The cam plate normally is held in its detent position by a small wave spring and detent humps resting in matching notches of the cam side gear. At this point, the ramps of the cam plate ride up on the ramps of the cam side gear, and the cam plate compresses the left clutch pack with a self-energizing action.

As the left clutch pack is compressed, it pushes the cam plate and cam side gear slightly toward the right side of the differential case. This movement of the cam side gear pushes the thrust block which compresses the right-hand side gear clutch pack.

At this point, the force of the self-energizing clutches and the side gear separating force combine to hold the side gears to the differential case in the locking stage.

The entire locking process occurs in less than 1 second. The process works with either the left or right wheel spinning, due to the design of the governor and cam mechanism. A torque reversal of any kind will unlatch the governor, causing the cam plate to ride back down to its detent position. Cornering or deceleration during a transmission shift will cause a torque reversal of this type. The differential unit returns to its limited-slip function.

The self-energizing process would not occur if it were not for the action of one of the left clutch discs. This energizing disc provides the holding force of the ramping action to occur. It is the only disc which is splined to the cam plate itself. The other splined discs fit on the cam side gear.

If the rotating speed of the ring gear and differential case assembly is high enough, the latching bracket will pivot due to centrifugal force. This will move the flyweights so that no locking is permitted. During vehicle driving, this happens at approximately 32 km/h (20 mph) and continues at faster speeds.

When comparing the effectiveness of the locking differential, in terms of percent-of-grade capability to open and limited-slip units, the locking differential has nearly 3 times the potential of the limited-slip unit under the same conditions.

Locking Differential Torque-Limiting Disc

The locking differential design was modified in mid-1986 to include a load-limiting feature to reduce the chance of breaking an axle shaft under abusive driving conditions. The number of tangs on the energizing disc in the left-hand clutch pack was reduced allowing these tangs to shear in the event of a high-torque engagement of the differential locking mechanism.

At the time of failure of the load-limiting disc, there will be a loud bang in the rear axle and the

differential will operate as a standard differential with some limited-slip action of the clutch packs at low torques.

The service procedure, when the disc tangs shear, involves replacing the left-hand clutch plates and the wave spring. It is also necessary to examine the axle shafts for twisting because at high torques it is possible to not only shear the load-limiting disc, but to also twist the axle shafts.

REAR DRIVE AXLE DESCRIPTION AND OPERATION

Rear axles for this vehicle consist of the following components:

- Differential axle housing
- Differential carrier
- Right and left axle tubes
- Right and left axle shafts

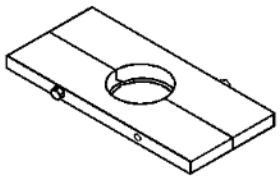
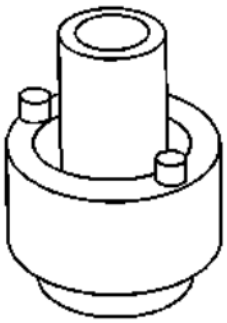
These axles are either full-floating or semi-floating. These axles can be identified as follows: The semi-floating axle has axle shafts with C-clips inside the differential carrier on the inner ends of the axle shafts. The full-floating axle has bolts at the hub retaining the axle shafts to the hub assembly. The axles can be identified by the stamping on the right side axle tube They may also be identified by the ring gear size. The ring gear sizes include 8.60, 9.50, 10.50 and 11.50 inch axles. The limited slip/locking differential information for these rear axles can be located in the limited slip/locking differential section.

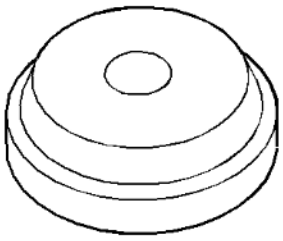
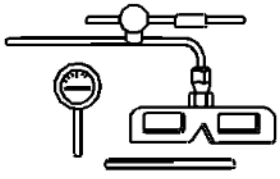
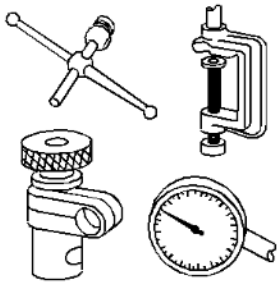
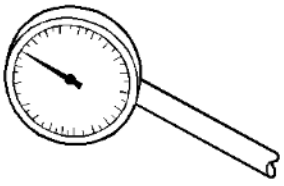
A open differential has a set of four gears. Two are side gears and 2 are pinion gears. Some differentials have more than 2 pinion gears. Each side gear is splined to an axle shaft so each axle shaft ; so each axle shaft turns when it's side gear rotates. The pinion gears are mounted on a differential pinion shaft, and the gears are free to rotate on this shaft. The pinion shaft is fitted into a bore in the differential case and is at right angles to the axle shafts. Power is transmitted through the differential as follows: the drive pinion rotates the ring gear. The ring gear being bolted to the differential case, rotates the case, The differential pinion, as it rotates the case, forces the pinion gears against the side gears. When both wheels have equal traction, the pinion gears do not rotate on the pinion shaft because of input force on the pinion gear is equally divided between the two side gears. Therefore, the pinion gears revolve with the pinion shaft, but do not rotate around the shaft itself. The side gears, being splined to the axle shafts and in mesh with the pinion gears rotate the axle shafts. If a vehicle were always driven in a straight line, the ring and pinion gears would be sufficient. The axle shaft could be solidly attached to the ring gear and both driving wheels would turn at equal speed. However, if it became necessary to turn a corner, the tires would scuff and slide because the differential allows the axle shafts to rotate at different speeds. When the vehicle turns a corner, the inner wheel turns slower than the out wheel and

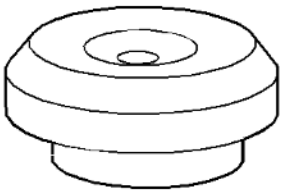
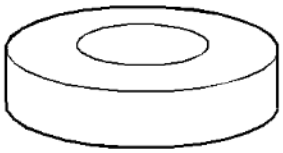
slows it's rear axle side gear (as the shaft is splined to the side gear). The rear axle pinion gears will roll around the slowed rear axle side gear, driving the rear axle side gear wheel faster.

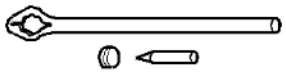
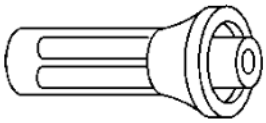
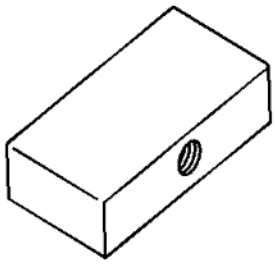
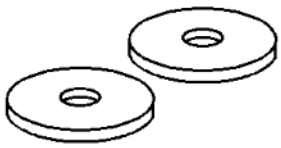
SPECIAL TOOLS AND EQUIPMENT

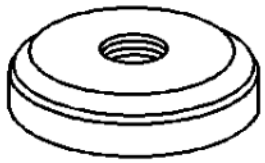
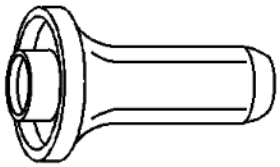
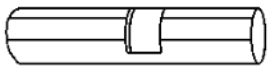
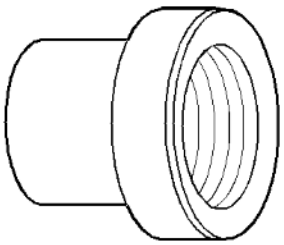
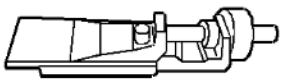
SPECIAL TOOLS

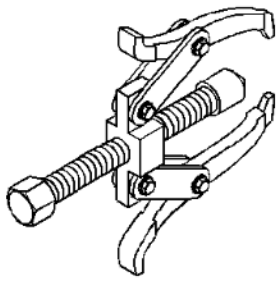
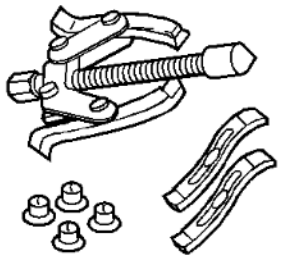
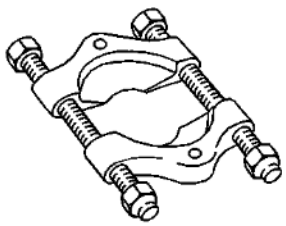
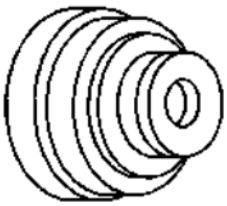
Illustration	Tool Number/Description
	DT 47688 Pinion Bearing Remover
	J 2222-C Wheel Bearing Nut Wrench
	J 2619-01 Slide Hammer
	J 7818 Inner Bearing Race Installer

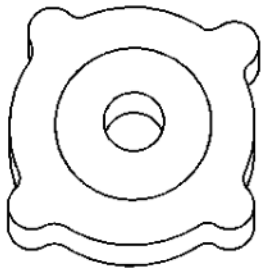
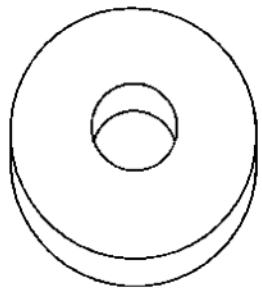
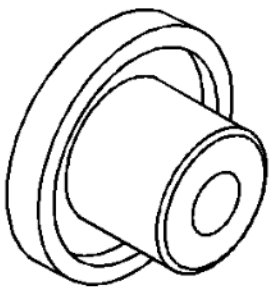
	
	J 7872 Magnetic Base Dial Indicator
	J 8001 Dial Indicator Set
	J 8001-3 Dial Indicator
	J 8092 Driver Handle

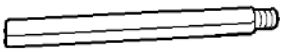
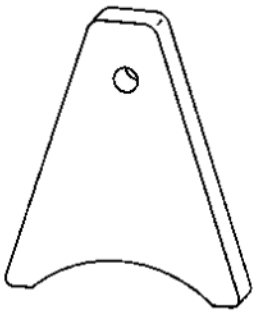
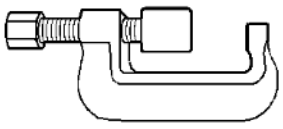
	
	J 8107-3 Side Bearing Puller Pilot
	J 8107-4 Side Bearing Puller Pilot
	J 8608 Rear Pinion Bearing Race Installer
	J 8611-01 Rear Pinion Bearing Race Installer

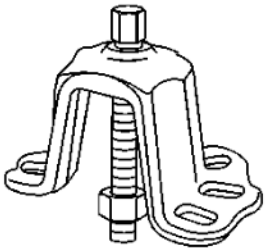
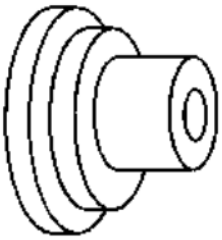
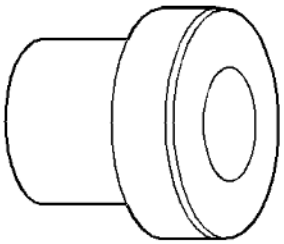
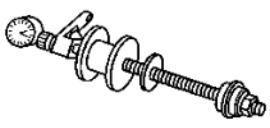
	J 8614-01 Flange and Pulley Holding Tool
	J 21128 Axle Pinion Oil Seal Installer
	J 21777-85 Gage and Plate - 9.5 in
	J 21777-86 Side Bearing Disc, 9.5 inch Axle, 2 Required
	J 21784 Side Bearing Installer

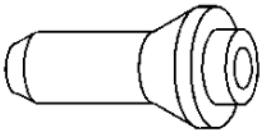
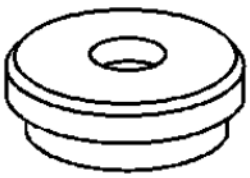
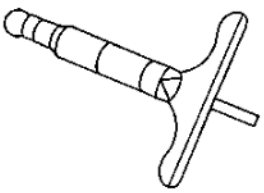
	J 22306 Pinion Cup Bearing Installer - Rear
	J 22388 Pinion Oil Seal Installer - Rear
	J 22536 Pinion Driver
	J 22761 Differential Side Bearing Installer
	J 22779 Side Bearing Backlash Gage
	J 22888-20A

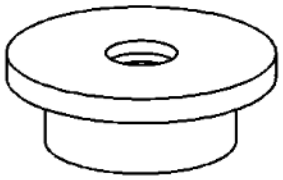
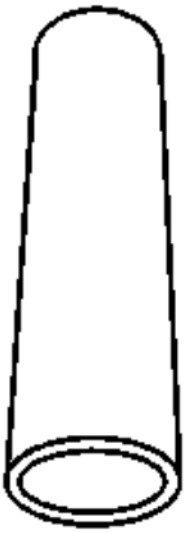
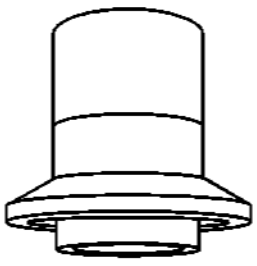
	Universal Two Jaw Puller
	J 22888-D Side Bearing Remover Kit
	J 22912-01 Rear Pinion and Axle Bearing Remover
	J 23690 Bearing Installer

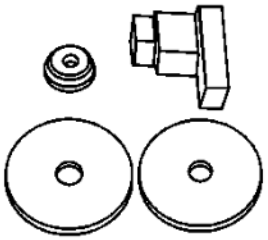
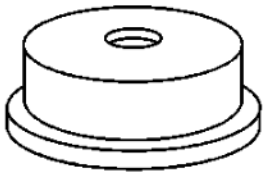
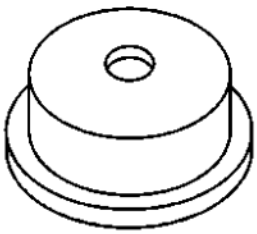
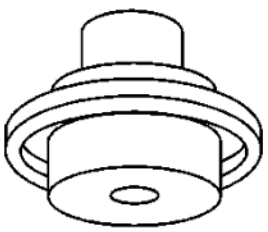
	J 24426 Wheel Bearing Race Installer - Outer
	J 24427 Wheel Bearing Race Installer - Inner
	J 24429 Side Bearing Backlash Spanner
	J 24430 Differential Side Bearing Installer

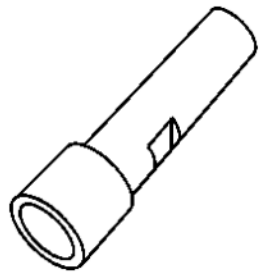
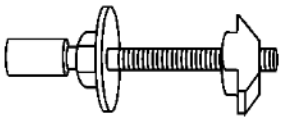
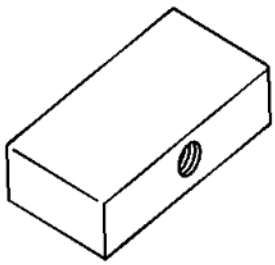
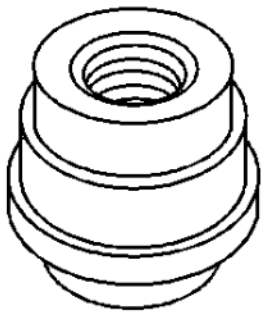
	J 24433 Pinion Cone and Side Bearing Installer
	J 25025 Guide Pins
	J 25025-1 Dial Indicator Mounting Post
	J 25588 Side Bearing Shim Installer
	J 26252 Locking Differential Governor Remover
	J 28733-B

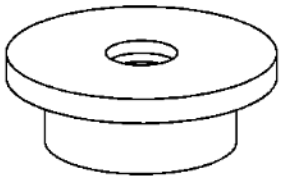
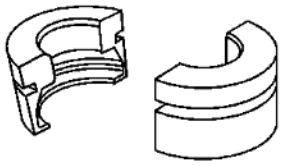
	Front/Rear Spindle Remover
	J 29709 Wheel Bearing Installer
	J 29710 Differential Side Bearing Installer
	J 29712 Wheel Bearing Remover

	J 29713 Axle Seal Installer
	J 34925 Pinion Setting Gage and Components
	J 36597 Side Bearing Puller Pilot - 9.25 Inch Axle
	J 36614 Inner Pinion Bearing Installer
	J 37624 Pinion Bearing Installer

	
	J 44412 Pinion Bearing Installer
	J 44414 Pinion Seal Installer

	J 44416 Pinion Setting Adapter Kit
	J 44417 Rear Pinion Bearing Race Installer
	J 44419 Hub Outer Bearing Race Installer
	J 44420 Differential Bearing and Hub Seal Installer

	J 44421 Pinion Remover
	J 44685 Rear Axle Seal and Bearing Remover
	J 45108 Pinion Setting Gage Block
	J 45232 Differential Bearing Adjuster Needle Bearing Installer - LH

	J 45870 Pinion Bearing Cup Installer
	J 45871 Pinion Bearing Remover