2004 DRIVELINE/AXLE

Rear Drive Axle - C/K SUV

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Axle Flange Bolts, 10.5" Axle	156 N.m	115 lb ft
Bearing Cap Bolts, 8.6" Axle	75 N.m	55 lb ft
Bearing Cap Bolts, 9.5" Axle	85 N.m	63 lb ft
Bearing Cap Bolts, 9.75" Axle	109 N.m	80 lb ft
Bearing Cap Bolts, 10.5" Axle	185 N.m	136 lb ft
Brake Backing Plate Bolts, All Except 9.75" Axle	140 N.m	103 lb ft
Brake Hose Bracket Bolt	22 N.m	16 lb ft
Brake Pipe Bracket Bolt	22 N.m	16 lb ft
Brake Pipe Bracket 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" Axle	26 N.m	19 lb ft
Differential Bearing Adjuster Nut Lock Bolt, 10.5" Axle	27 N.m	20 lb ft
Differential Housing Cover Bolts, All Except 9.75" Axle	40 N.m	30 lb ft
Drain Plug, All Except 9.75" Axle	33 N.m	24 lb ft
Drain Plug, 9.75" Axles	27 N.m	20 lb ft
Fill Plug, All Except 9.75" Axle	33 N.m	24 lb ft
Fill Plug, 9.75" Axle	21 N.m	15 lb ft
Jounce Bracket Bolt, 9.75" Axle	12 N.m	106 lb in
Pinion Bearing Cage Bolts, 10.5" Axle	88 N.m	65 lb ft
Pinion Shaft Lock Bolt, 8.6" Axle	36 N.m	27 lb ft
Pinion Shaft Lock Bolt, 9.5" Axle	50 N.m	37 lb ft
Pinion Yoke Nut, 9.75" Axle	370 N.m	273 lb ft
Propeller Shaft Retainer Bolts	25 N.m	18 lb ft
Ring Gear Bolts, 8.6" Axle	120 N.m	89 lb ft
Ring Gear Bolts, 9.5" Axle	140 N.m	103 lb ft
Ring Gear Bolts, 9.75" Axle	178 N.m	131 lb ft
Ring Gear Bolts, 10.5" Axle	165 N.m	122 lb ft
U-Bolt Nuts, 15 Series and 25 Series w/o 8.1 L Engine	72 N.m	53 lb ft
U-Bolt Nuts, 15 Series w/ RPO NYS and 25 Series w/ 8.1 L Engine	150 N.m	110 lb ft
Wheel Hub Nut, 10.5" Axle	70 N.m	52 lb ft

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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 Inch Axle Differential Adjustment Shims Specifications

# of Stripes	Color	Specification	
		Metric	English
1	Orange	5.59 mm	0.220"

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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"

AXLE PRELOAD AND BACKLASH SPECIFICATIONS

Axle Preload and Backlash Specifications

Application	Specification	
	Metric	English
Backlash	0.08-0.25 mm	0.003-0.010"
Backlash, Preferred	0.13-0.18 mm	0.005"-0.007"
Pinion and Differential Case Bearing Preload, New Bearings, All Except 9.75" Axle	3.4-6.2 N.m	30-55 lb in
Pinion and Differential Case Bearing Preload, New Bearings, 9.75" Axle	4.0-6.4 N.m	35-57 lb in
Pinion and Differential Case Bearing Preload, Used Bearings, All Except 9.75" Axle	2.8-5.1 N.m	25-45 lb in
Pinion Bearing Preload, New Bearings, All Except 9.75" Axle	1.7-3.4 N.m	15-30 lb in
Pinion Bearing Preload, New Bearings, 9.75" Axle	2.3-5.1 N.m	20-45 lb in
Pinion Bearing Preload, Used Bearings, All Except 9.75" Axle	1.1-2.3 N.m	10-20 lb in

SEALERS, ADHESIVES, AND LUBRICANTS

Sealers, Adhesives, and Lubricants

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Application	Type of Material	GM Part Number
Rear Drive Axle, All Except 9.75" Axle	Lubricant	12378261 (Canadian P/N 10953455) or equivalent meeting GM Specification 9986115
Rear Drive Axle, 9.75" Axle	Lubricant	12378557 (Canadian P/N 88901362) or equivalent meeting GM Specification 9986207
Pinion Gear Bearing Retainer	Sealant	1052942 (Canadian P/N 10953466) or equivalent
Pinion Yoke Splines	Sealant	12346004 (Canadian P/N 10953480) or equivalent

COMPONENT LOCATOR

REAR AXLE DISASSEMBLED VIEWS

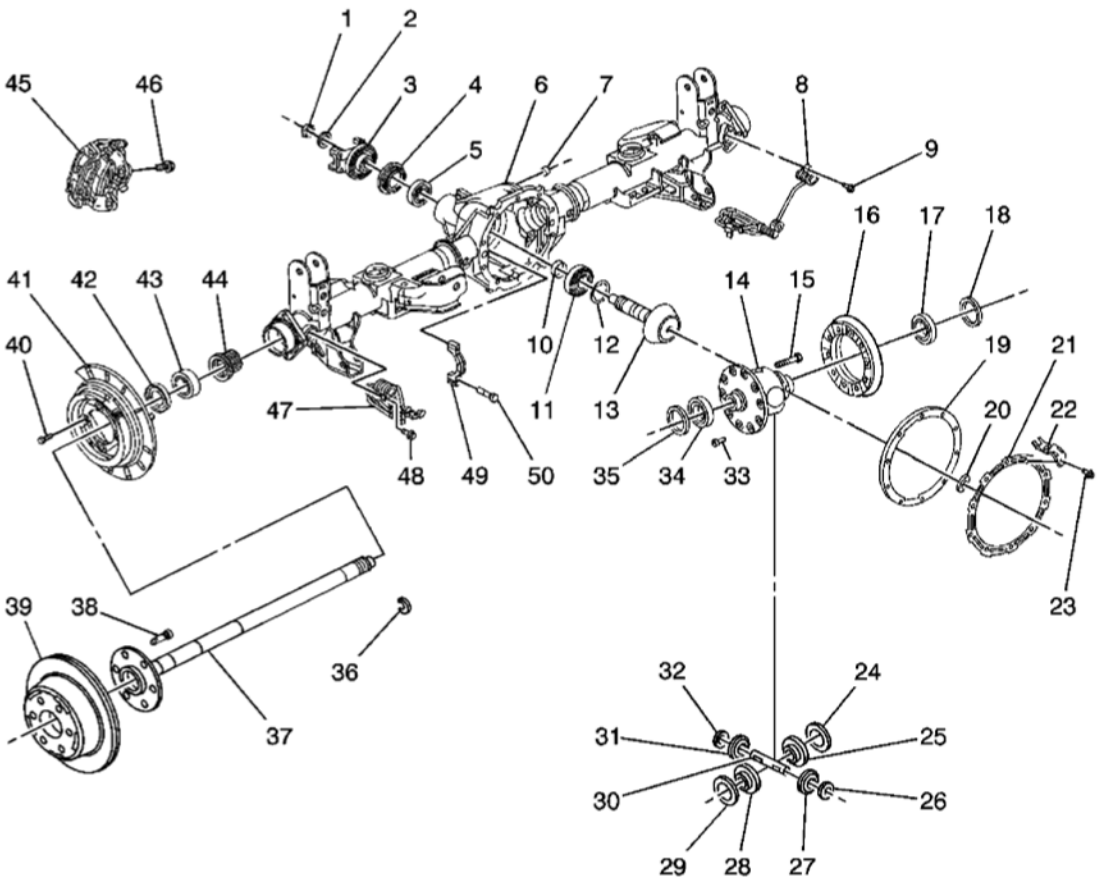


Fig. 1: 8.6 Inch Rear Axle Disassembled View

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Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1

Callout	Component Name
1	Pinion Gear Nut
2	Pinion Gear Washer
3	Pinion Gear Yoke
4	Pinion Gear Oil Seal
5	Pinion Gear Outer Bearing and Cup
6	Rear Axle Housing
7	Rear Axle Housing Fill Plug
8	Wheel Speed Sensor Assembly
9	Bolt
10	Pinion Gear Bearing Spacer
11	Pinion Gear Inner Bearing and Cup
12	Pinion Gear Bearing Shim
13	Differential Drive Pinion Gear
14	Differential Case
15	Pinion Gear Shaft Lock Bolt
16	Differential Ring Gear
17	Differential Side Bearing and Cup
18	Differential Side Bearing Shim
19	Rear Axle Housing Cover Gasket
20	Rear Axle Housing Cover Magnet
21	Rear Axle Housing Cover
22	Brake Pipe Clip
23	Rear Axle Housing Cover Bolt
24	Thrust Washer
25	Differential Side Gear
26	Thrust Washer
27	Differential Pinion Gear
28	Differential Side Gear
29	Thrust Washer
30	Differential Pinion Gear Shaft
31	Differential Pinion Gear
32	Thrust Washer
33	Differential Ring Gear Bolt
34	Differential Side Bearing and Cup
35	Differential Side Bearing Shim
36	Rear Axle Shaft Lock
37	Rear Axle Shaft

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38	Stud
39	Brake Rotor
40	Bolt
41	Brake Backing Plate
42	Rear Axle Shaft Oil Seal
43	Rear Axle Shaft Wheel Bearing
44	Wheel Speed Sensor Ring Assembly
45	Brake Caliper
46	Brake Caliper Bolt
47	Wheel Speed Sensor Assembly
48	Bolt
49	Differential Bearing Cap
50	Differential Bearing Cap Bolt

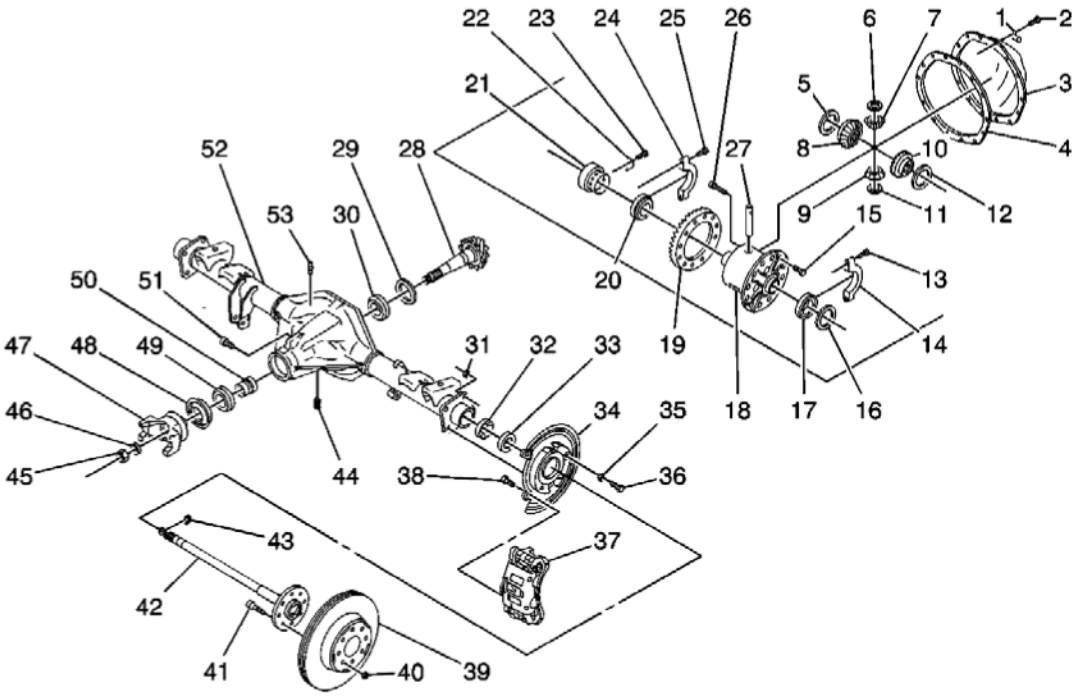


Fig. 2: 9.5 Inch Rear Axle Disassembled View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 2

Callout	Component Name
1	Brake Pipe Clip
2	Rear End Housing Cover Bolt

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3	Rear Axle Housing Cover
4	Rear Axle Housing Cover Gasket
5	Thrust Washer
6	Thrust Washer
7	Differential Pinion Gear
8	Differential Side Gear
9	Differential Pinion Gear
10	Differential Side Gear
11	Thrust Washer
12	Thrust Washer
13	Differential Bearing Cap Bolt
14	Differential Bearing Cap
15	Differential Ring Gear Bolt
16	Differential Bearing Shim
17	Differential Bearing
18	Differential Case
19	Differential Ring Gear
20	Differential Bearing
21	Differential Bearing Adjusting Nut
22	Differential Bearing Adjusting Nut Lock
23	Bolt
24	Differential Bearing Cap
25	Differential Bearing Cap Bolt
26	Pinion Gear Shaft Lock Bolt
27	Pinion Gear Shaft
28	Pinion Gear
29	Pinion Gear Bearing Shim
30	Pinion Gear Inner Bearing
31	Park Brake Nut
32	Bearing
33	Rear Axle Shaft Seal
34	Brake Backing Plate
35	Washer
36	Brake Backing Plate Bolt
37	Brake Caliper
38	Brake Caliper Bolt
39	Brake Rotor
40	Nut
41	Stud
42	Rear Axle Shaft
43	Rear Axle Shaft Lock

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	Rear Axle Housing Drain Plug
45	Pinion Gear Nut
46	Washer
47	Pinion Gear Yoke
48	Pinion Gear Seal
49	Front Pinion Gear Bearing
50	Pinion Gear Bearing Spacer
51	Rear Axle Housing Fill Plug
52	Rear Axle Housing
53	Rear Axle Vent Hose Connector

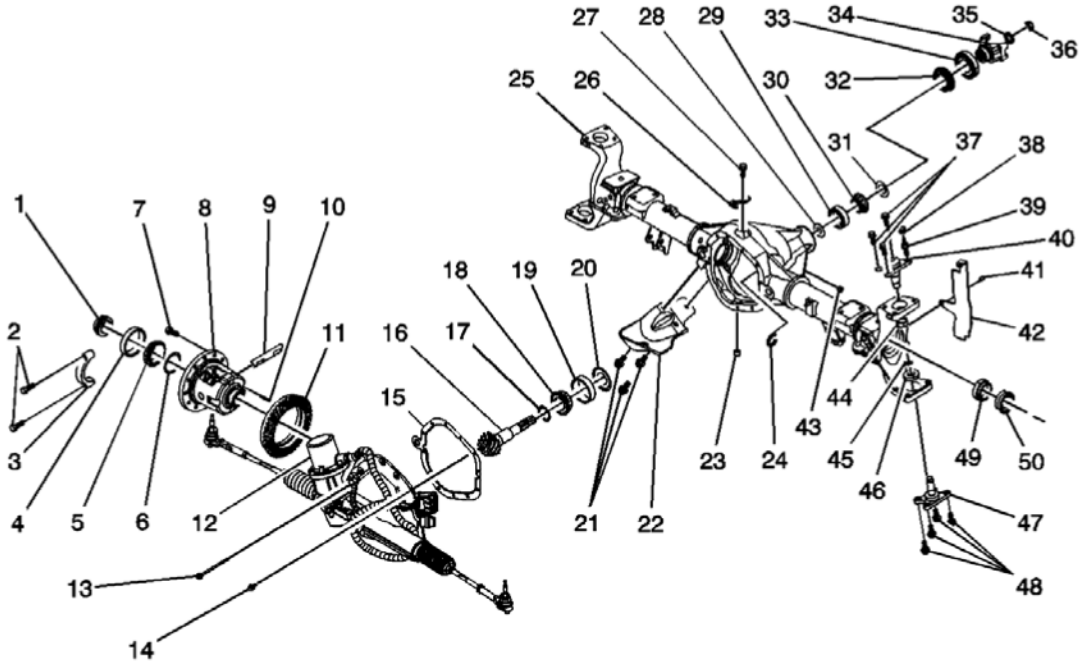


Fig. 3: 9.75 Inch Rear Axle - Axle Housing Components Disassembled View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Rear Axle Shaft Seal - Inner
2	Differential Bearing Cap Bolts
3	Differential Bearing Cap
4	Differential Case Bearing Cup
5	Differential Case Bearing
6	Differential Bearing Shim

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7	Differential Ring Gear Bolt
8	Differential Case
9	Differential Pinion Gear Shaft
10	Differential Pinion Gear Shaft Pin
11	Differential Ring Gear
12	Steering Actuator Assembly
13	Bolt
14	Bolt
15	Rear Axle Housing Cover Gasket
16	Pinion Gear Shaft
17	Pinion Gear Bearing Shim
18	Pinion Bearing - Inner
19	Pinion Bearing Cup - Inner
20	Oil Baffle
21	Bolts
22	Steering Actuator Assembly Shield
23	Drain Plug
24	Rear Axle Shaft Lock
25	Rear Axle Housing
26	Clip
27	Bolt
28	Pinion Preload Shim
29	Pinion Bearing Cup - Outer
30	Pinion Bearing - Outer
31	Thrust Washer
32	Pinion Oil Seal
33	Pinion Yoke Deflector
34	Pinion Yoke
35	Pinion Yoke Washer
36	Pinion Yoke Nut
37	Bolts
38	Nut
39	Bolt/Stud
40	Ball Joint Assembly - Upper
41	Bolt
42	Skid Plate
43	Fill Plug
44	Ball Joint Assembly Nut
45	Snap Ring
46	Seal
47	Ball Joint Assembly - Lower

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	Bolts
49	Rear Axle Shaft Guide
50	Rear Axle Shaft Seal - Outer

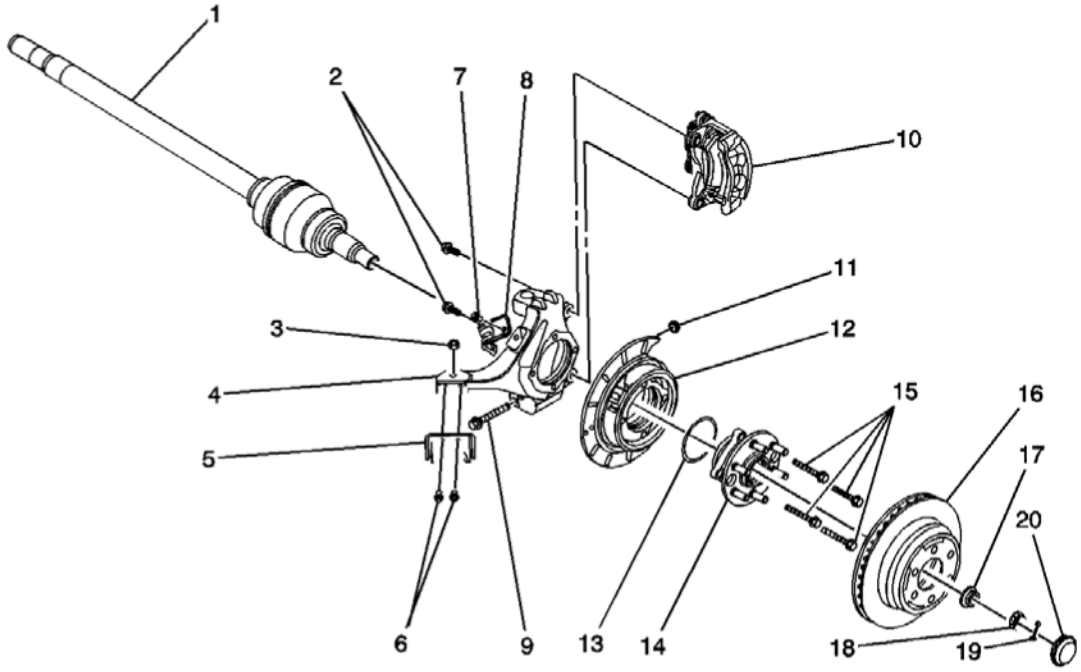


Fig. 4: 9.75 Inch Rear Axle - Wheel End Components Disassembled View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Rear Axle Shaft Assembly
2	Bolts
3	Nut
4	Steering Knuckle
5	Tie Rod Bracket
6	Bolts
7	Bolt
8	Brake Cable Bracket
9	Bolt
10	Brake Caliper
11	Nut
12	Brake Backing Plate Assembly
13	O-Ring Seal

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14	Hub Assembly
15	Bolts
16	Brake Rotor
17	Nut
18	Retainer
19	Pin
20	Cap

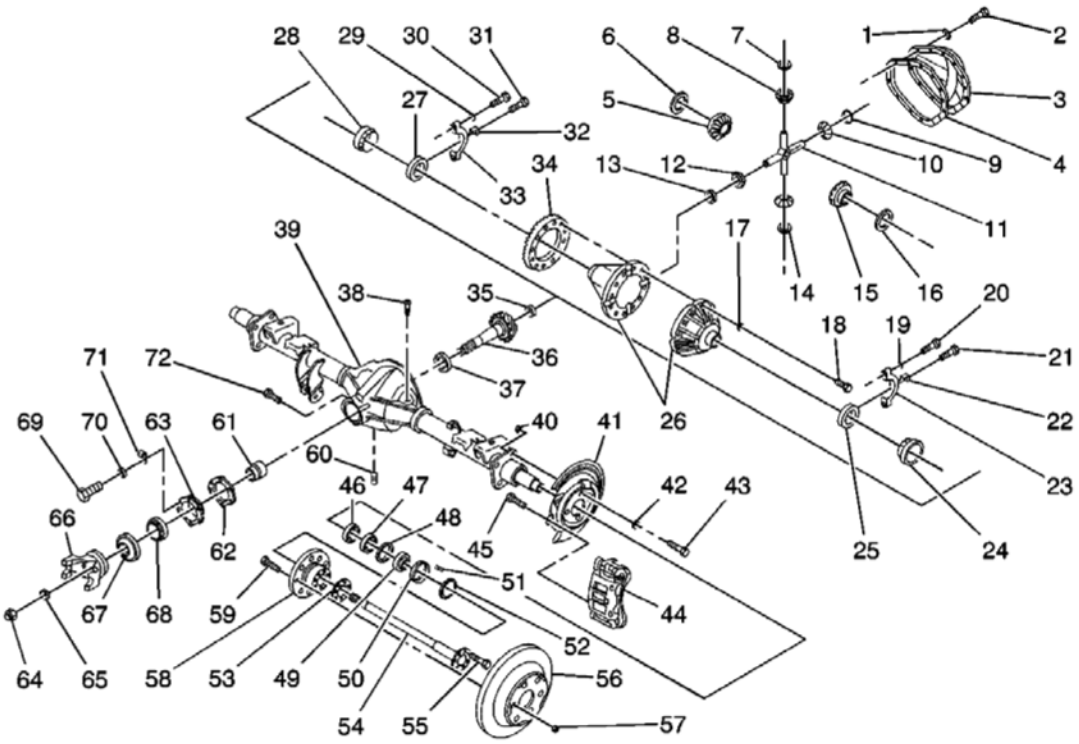


Fig. 5: 10.5 Inch Rear Axle Disassembled View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	Brake Pipe Clip
2	Rear Axle Housing Cover Bolt
3	Rear Axle Housing Cover
4	Rear Axle Housing Cover Gasket
5	Differential Side Pinion Gear
6	Thrust Washer
7	Thrust Washer

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8	Differential Pinion Gear
9	Thrust Washer
10	Differential Pinion Gear
11	Differential Pinion Gear Spider
12	Differential Pinion Gear
13	Thrust Washer
14	Thrust Washer
15	Differential Side Pinion Gear
16	Thrust Washer
17	Washer
18	Differential Ring Gear Bolt
19	Washer
20	Differential Bearing Cap Bolt
21	Differential Adjuster Lock Nut Bolt
22	Differential Adjuster Lock
23	Differential Bearing Cap
24	Differential Bearing Adjuster Nut
25	Differential Case Bearing
26	Differential Case
27	Differential Case Bearing
28	Differential Bearing Adjuster Nut
29	Washer
30	Differential Bearing Cap Bolt
31	Differential Adjuster Lock Nut Bolt
32	Differential Adjuster Lock
33	Differential Bearing Cap
34	Differential Ring Gear
35	Pinion Gear Pilot Bearing
36	Drive Pinion Gear
37	Pinion Gear Inner Bearing
38	Rear Axle Housing Vent
39	Rear Axle Housing
40	Park Brake Nut
41	Brake Backing Plate
42	Washer
43	Park Brake Bolt
44	Brake Caliper
45	Brake Caliper Bolt
46	Hub Seal
47	Inner Bearing Assembly
48	Outer Bearing Retaining Ring

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	Outer Bearing Assembly
50	Wheel Bearing Adjuster Nut
51	Wheel Bearing Adjuster Nut Key
52	Wheel Bearing Adjuster Nut Key Retainer
53	Wheel Hub Gasket
54	Axle Shaft
55	Rear Axle Shaft Bolt
56	Brake Rotor
57	Nut
58	Wheel Hub
59	Stud
60	Rear Axle Housing Drain Plug
61	Pinion Gear Bearing Spacer
62	Pinion Gear Bearing Shim
63	Pinion Gear Bearing Retainer
64	Pinion Gear Nut
65	Washer
66	Pinion Yoke
67	Pinion Gear Seal
68	Pinion Gear Outer Bearing
69	Bolt
70	Washer
71	Park Brake Clip
72	Rear Axle Housing Fill Plug

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DIAGNOSTIC INFORMATION AND PROCEDURES

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 - Rear Drive Axle** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

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

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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

Noisy in Drive

Checks	Action
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.
Worn pinion and ring gear	Replace the pinion and the ring gear. Refer to **Drive Pinion and Ring**

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	Gear Replacement (8.6 Inch, 9.5 Inch Axle) or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
Loose pinion bearings	Adjust the pinion bearings preload. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.
Excessive pinion end play	Adjust the pinion end play. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.
Worn differential bearings	Replace the differential bearings. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.
Loose differential bearings	Adjust the differential bearing preload. Refer to **Differential Side Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.5 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.75 Inch Axle)** or **Differential Side Bearing Preload Adjustment (10.5 Inch Axle)**.
Excessive ring gear runout	Replace the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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 **Lubricant Level Inspection - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.75 Inch Axle)**.
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
Bent axle housing	Replace the axle housing. Refer to **Rear Axle Housing Replacement (All Except 9.75 Inch Axle)** or **Rear Axle Housing Replacement (9.75 Inch Axle)**.

NOISY WHEN COASTING

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 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive**

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	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 (9.75 Inch Axle)**.

INTERMITTENT NOISE

Intermittent Noise

Checks	Action
Warped ring gear	Replace the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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

Constant Noise

Checks	Action
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 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 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 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Worn axle shaft dowel holes	Replace the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)** or to **Rear Axle Shaft and/or Gasket Replacement**.
Worn hub studs	Replace the wheel studs. Refer to **Wheel Stud Replacement** in Rear Suspension.
Bent axle shaft	Replace the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)** or **Rear Axle Shaft and/or Gasket Replacement**.

NOISY ON TURNS

Noisy on Turns

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Checks	Action
Worn differential side gears and pinions	Replace the differential side gears and pinions. Refer to **Differential Overhaul (9.5 Inch Axle)** or **Differential Overhaul (10.5 Inch Axle)** or **Differential Overhaul (8.6 Inch Axle)**.
Worn differential spider	Replace the spine gears. Refer to **Differential Overhaul (9.5 Inch Axle)** or **Differential Overhaul (10.5 Inch Axle)** or **Differential Overhaul (8.6 Inch Axle)**.
Worn axle shaft splines	Replace the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)** or **Rear Axle Shaft and/or Gasket Replacement**.

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

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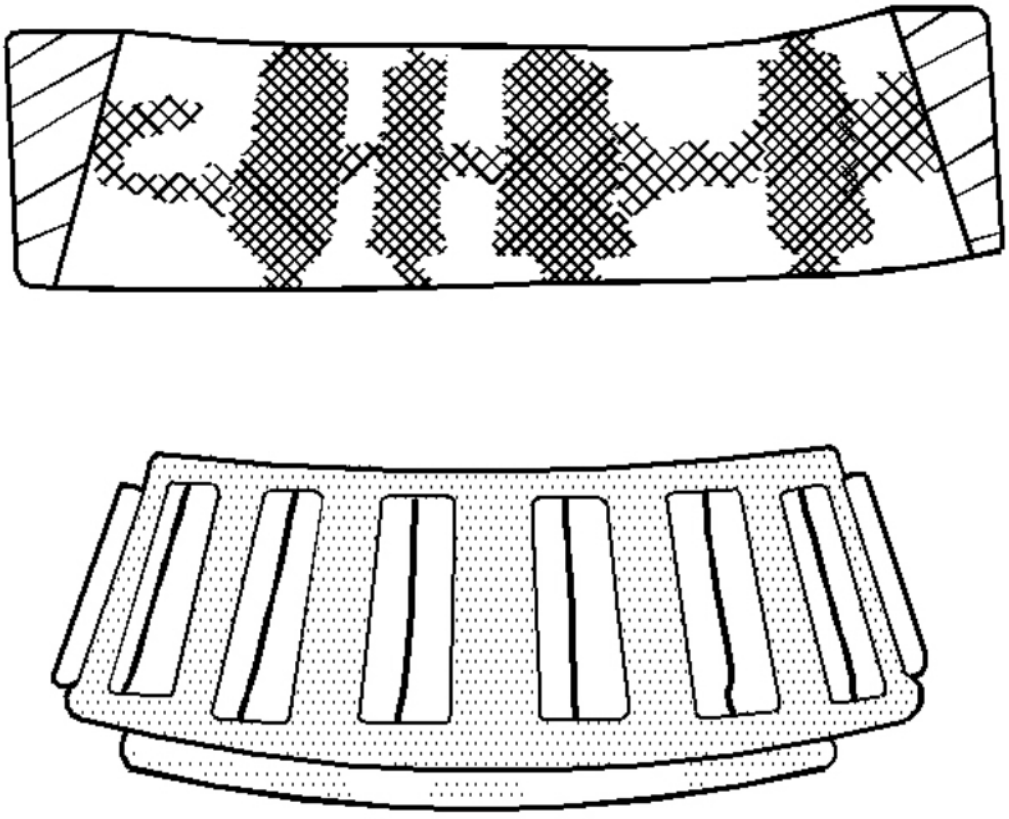


Fig. 6: Identifying Abrasive Roller Wear
Courtesy of GENERAL MOTORS CORP.

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

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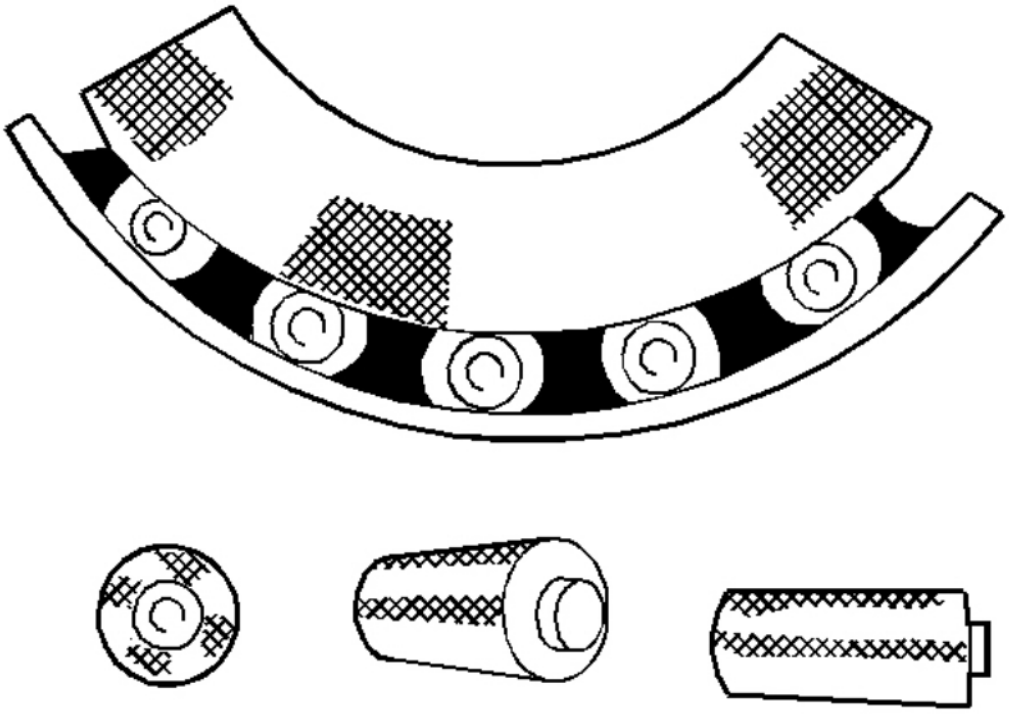


Fig. 7: Identifying Abrasive Step Wear
Courtesy of GENERAL MOTORS CORP.

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

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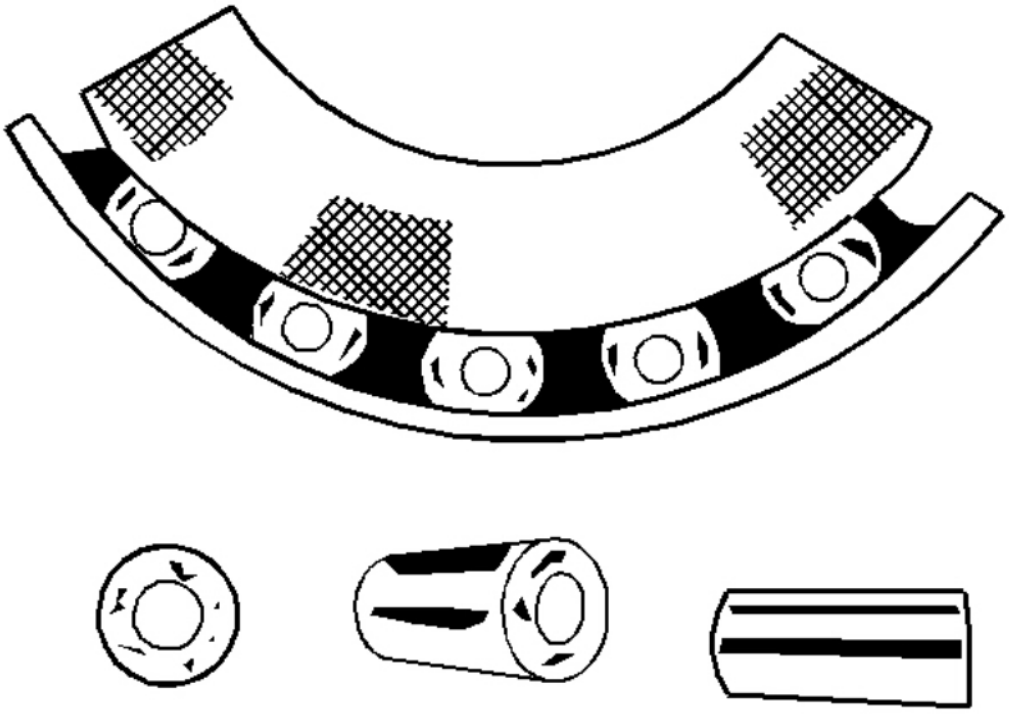


Fig. 8: Identifying Galling
Courtesy of GENERAL MOTORS CORP.

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

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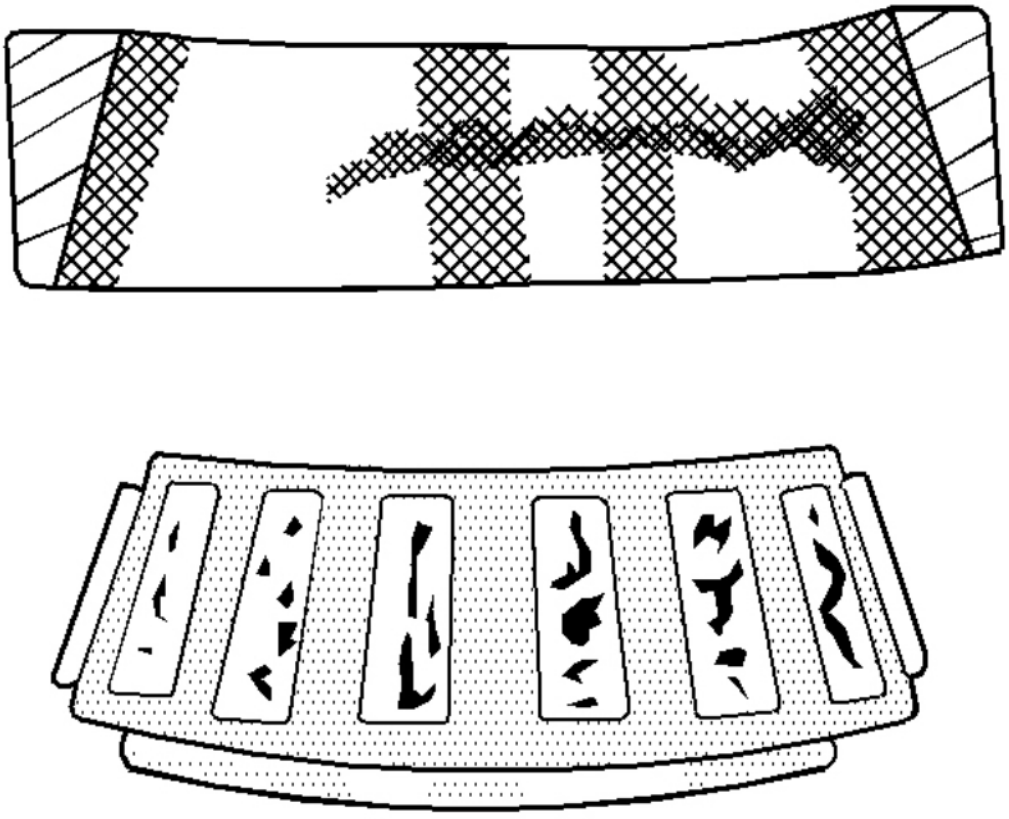


Fig. 9: Identifying Etching
Courtesy of GENERAL MOTORS CORP.

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

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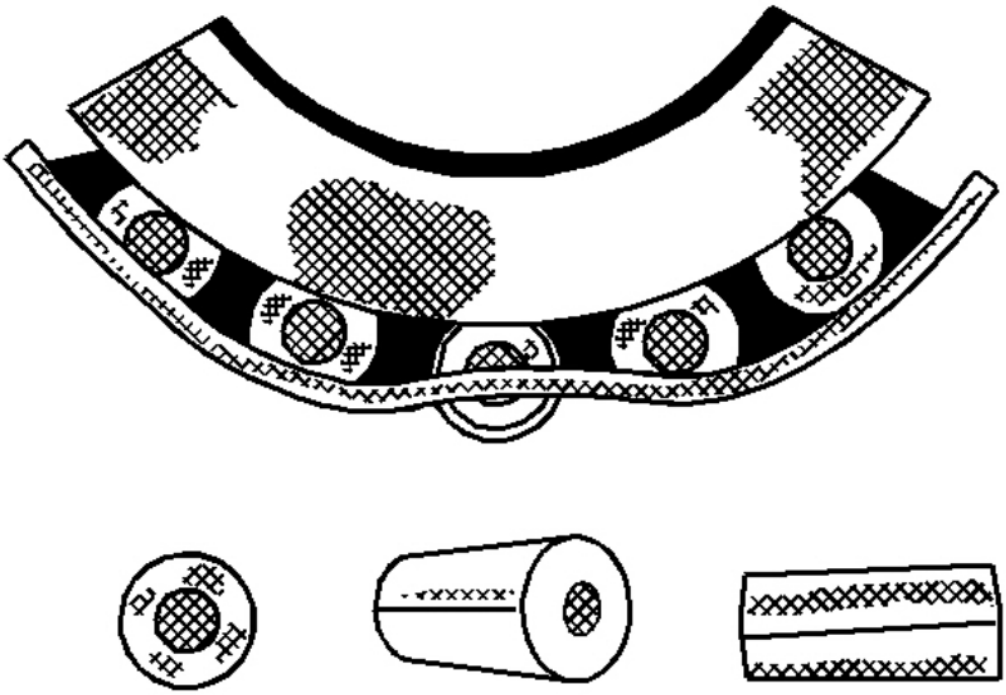


Fig. 10: Identifying Bent Roller Cage
Courtesy of GENERAL MOTORS CORP.

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

Cage Wear

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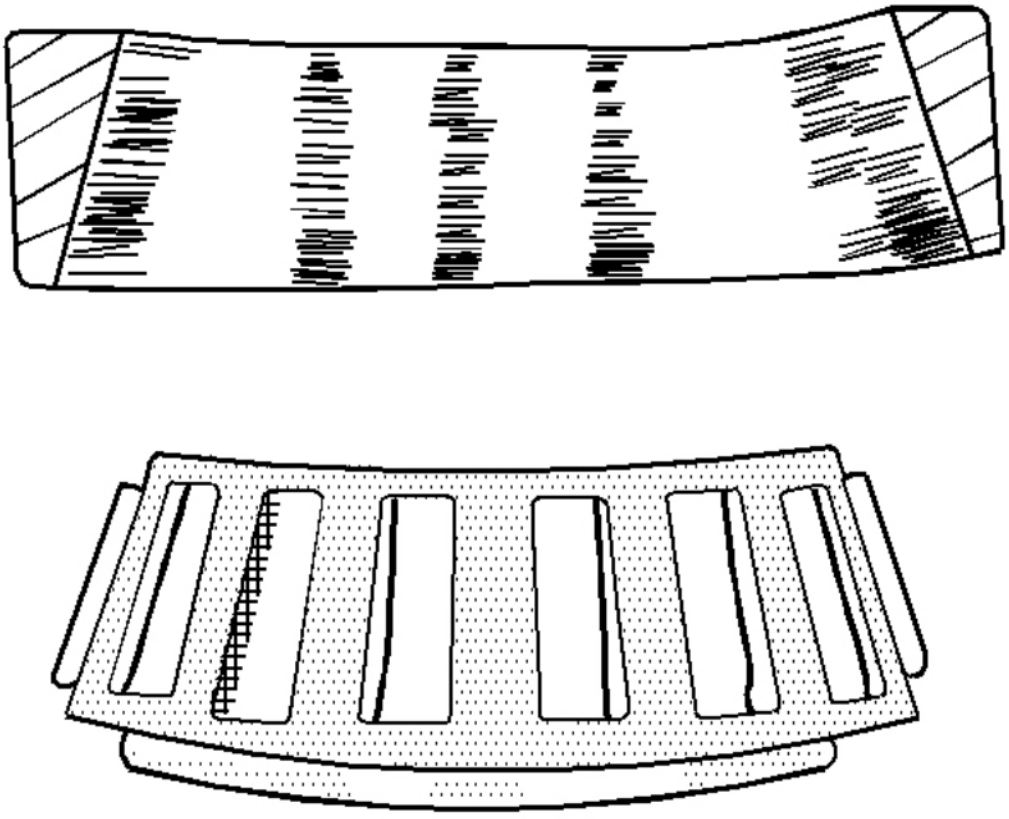


Fig. 11: Identifying Cage Wear
Courtesy of GENERAL MOTORS CORP.

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

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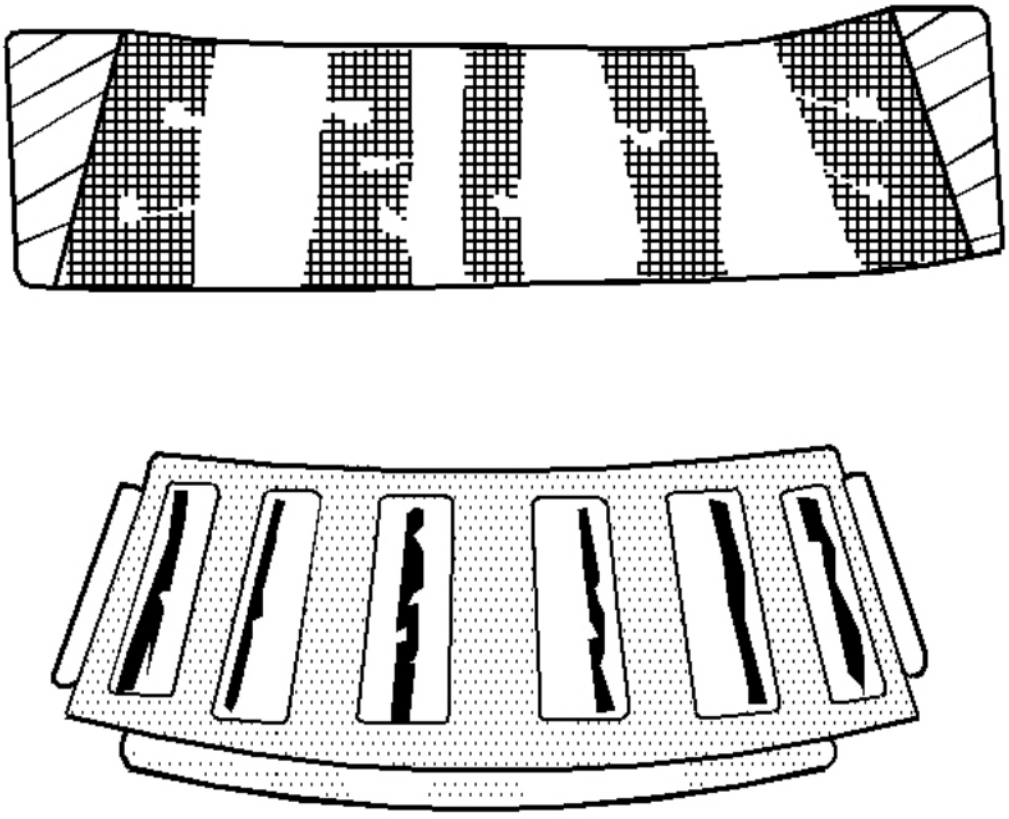


Fig. 12: Inspecting Bearing Rollers & Races For Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

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

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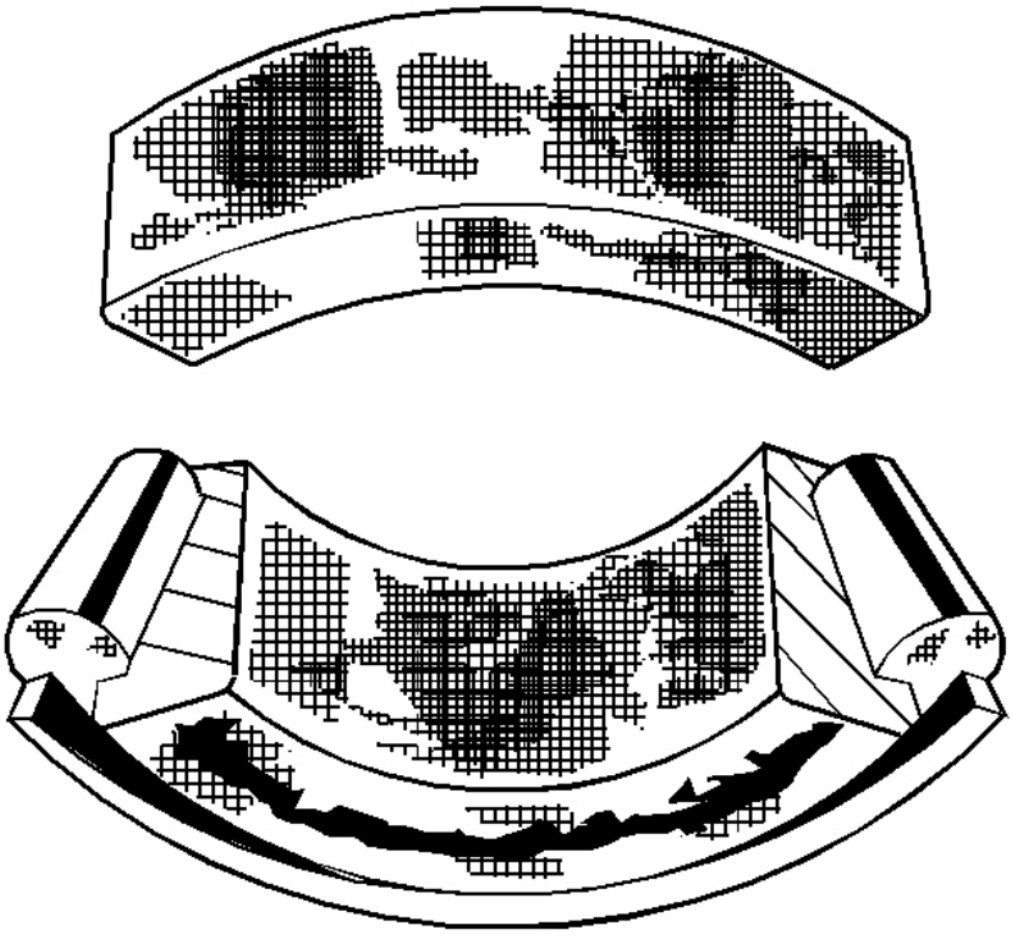


Fig. 13: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

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

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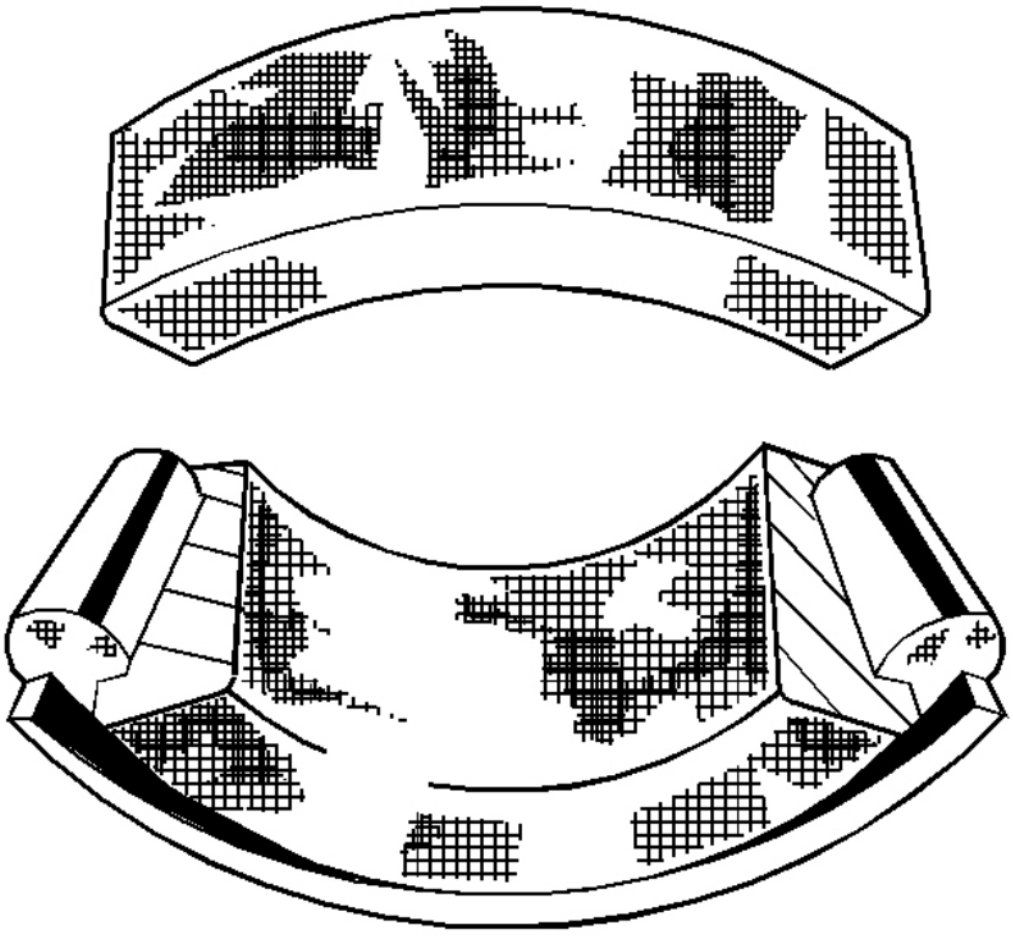


Fig. 14: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

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.

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Stain Discoloration

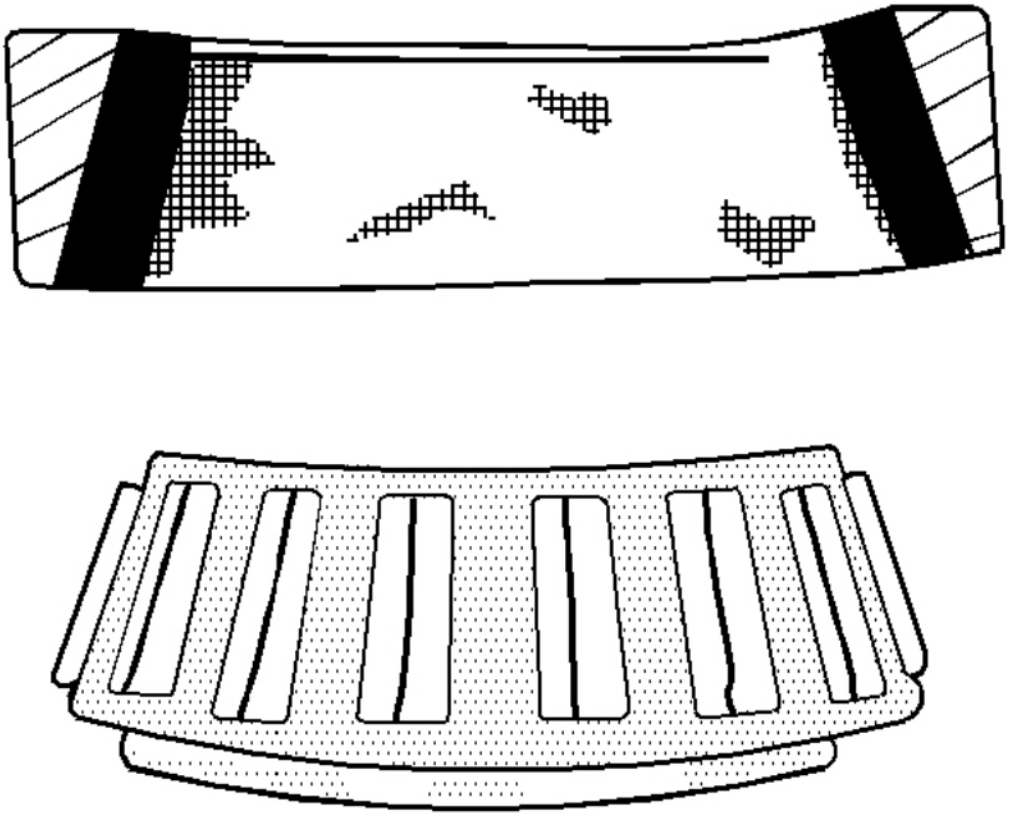


Fig. 15: Identifying Stain Discoloration
Courtesy of GENERAL MOTORS CORP.

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

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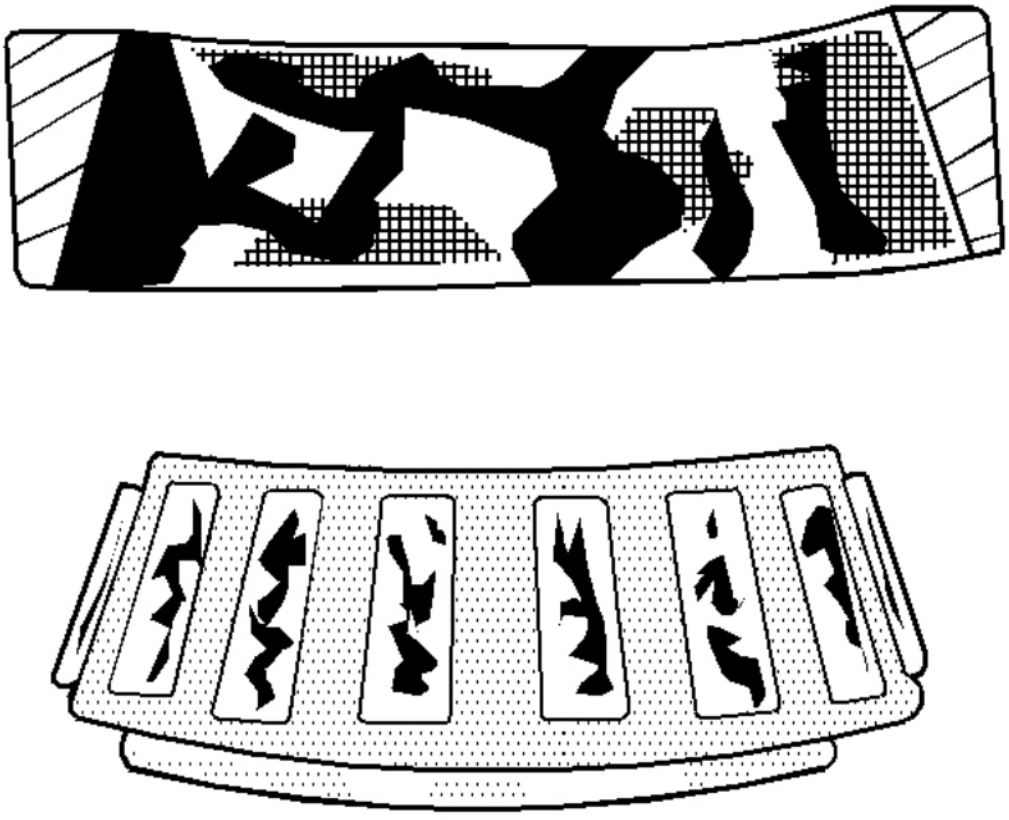


Fig. 16: Identifying Heat Discoloration
Courtesy of GENERAL MOTORS CORP.

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

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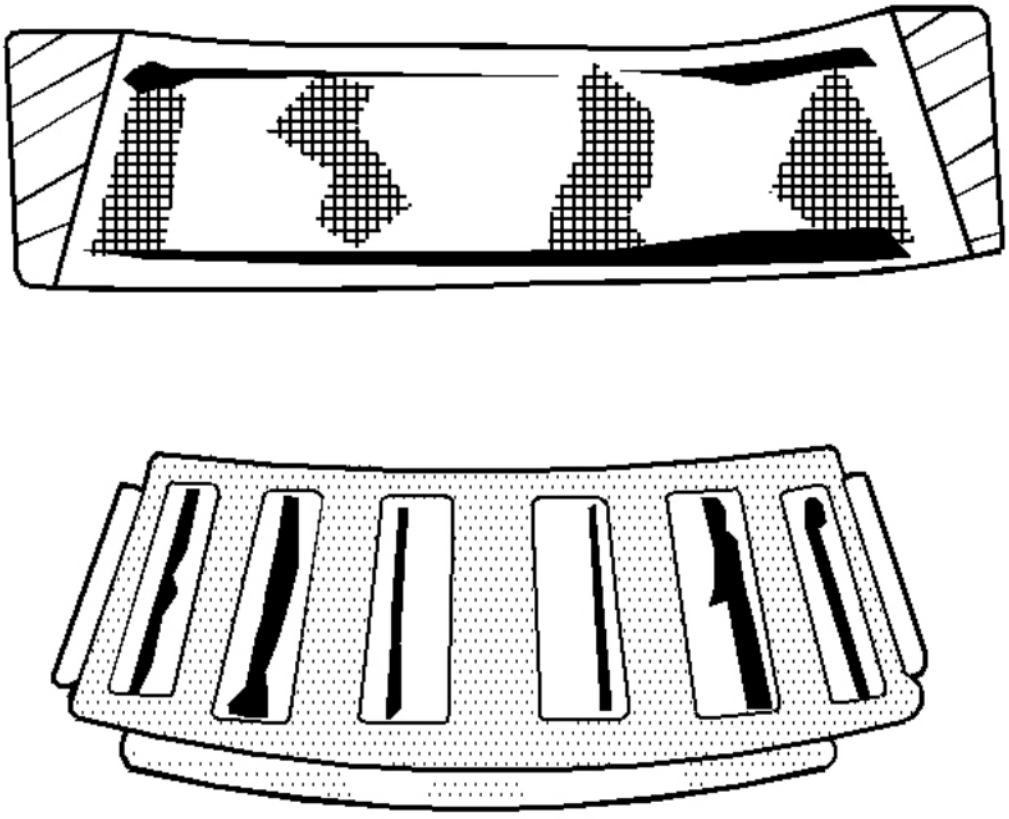


Fig. 17: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

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

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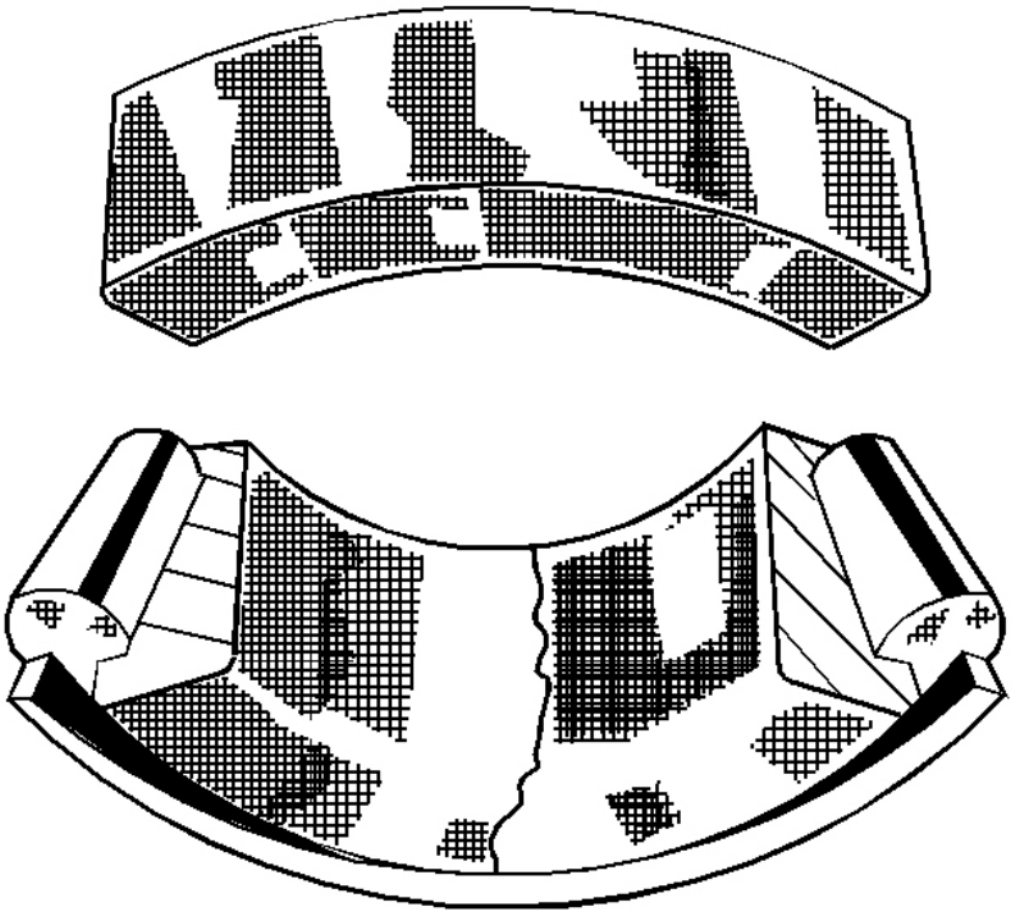


Fig. 18: Identifying Cracked Inner Race
Courtesy of GENERAL MOTORS CORP.

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

Fatigue Spalling

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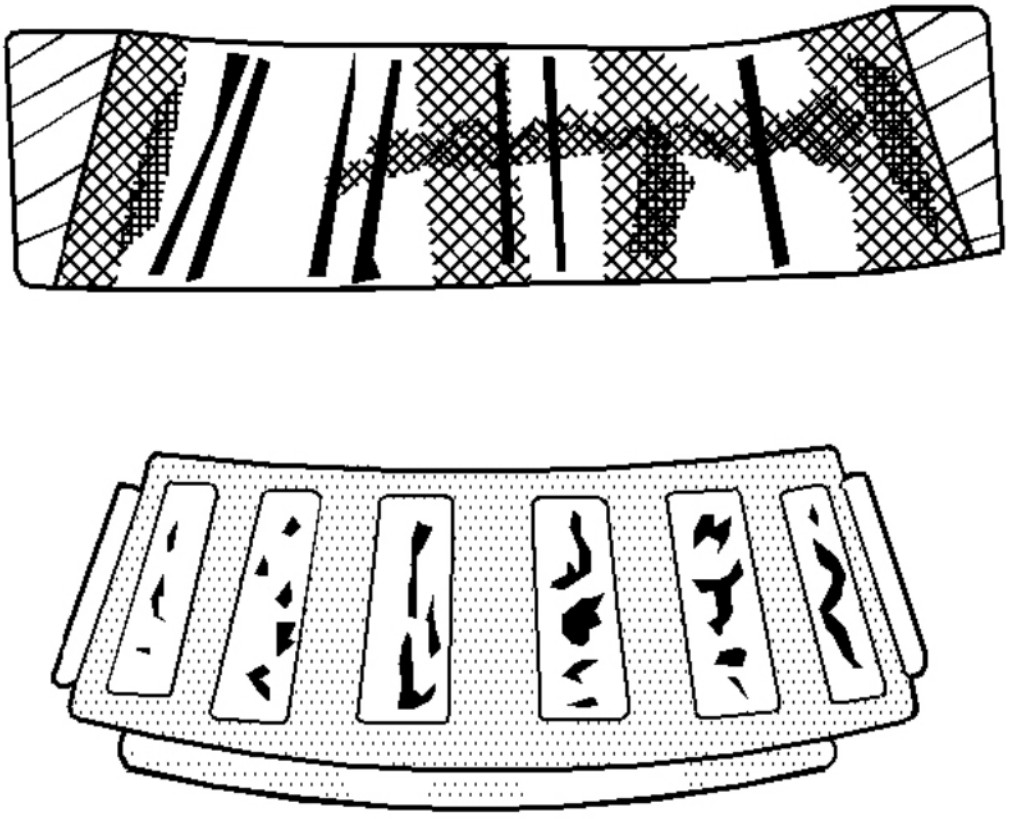


Fig. 19: Inspecting Bearing Rollers & Races For Pitting, Grooves, Spalling & Excessive Wear
Courtesy of GENERAL MOTORS CORP.

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

Brinelling

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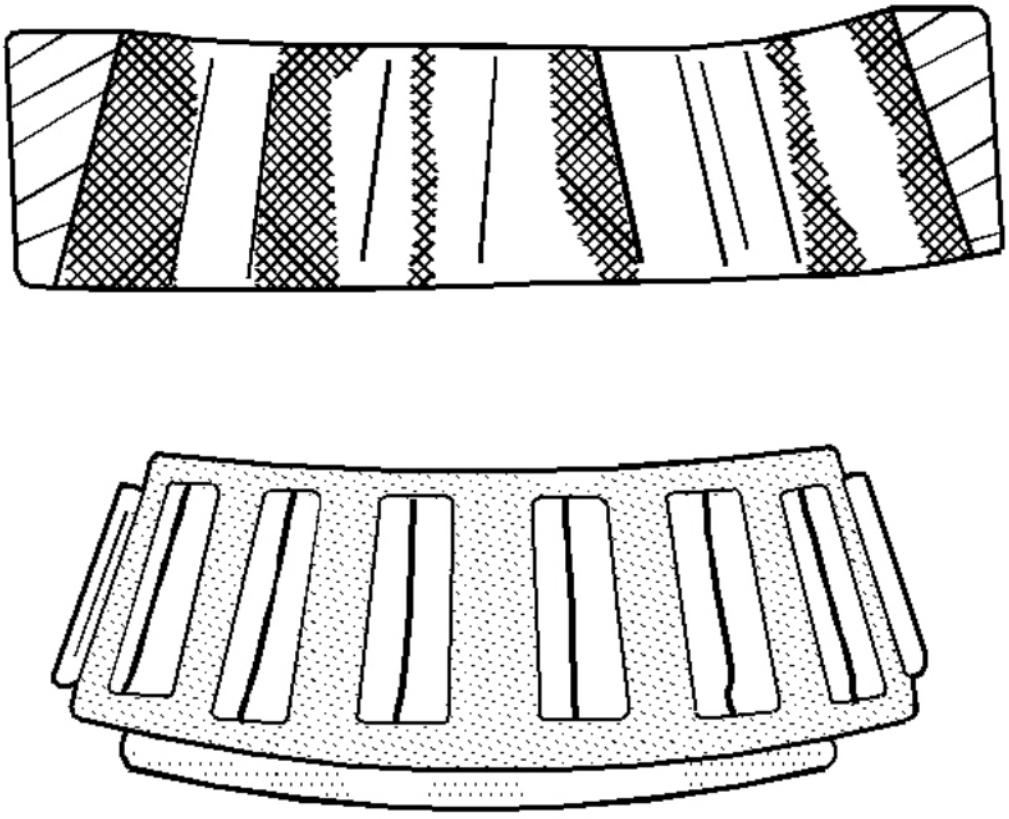


Fig. 20: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

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.

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.

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Wear (Minor)

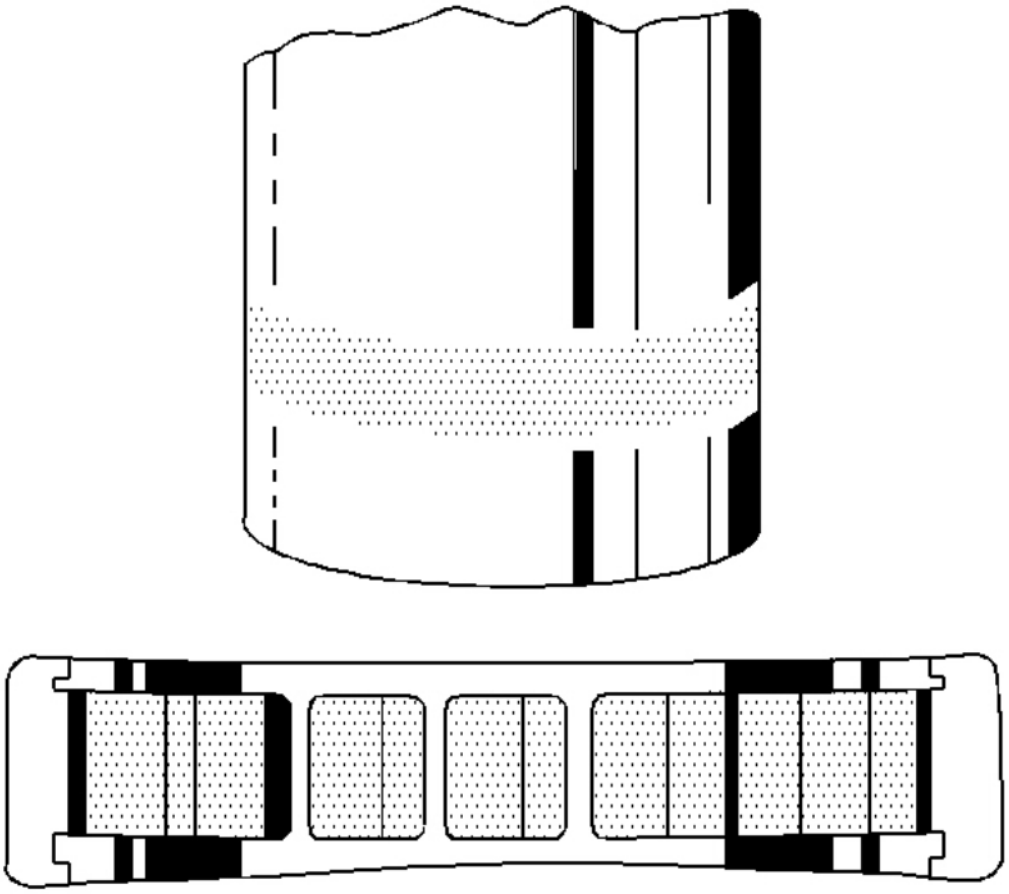


Fig. 21: Identifying Minor Wear
Courtesy of GENERAL MOTORS CORP.

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)

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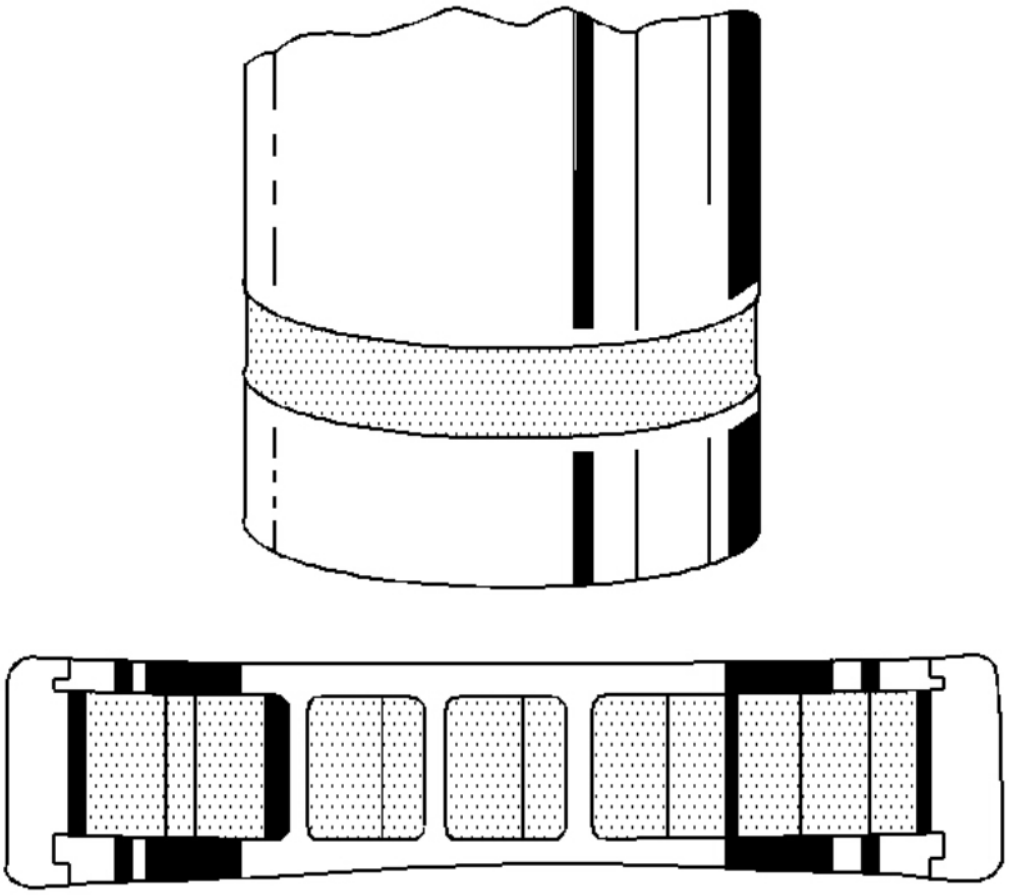


Fig. 22: Identifying Major Wear
Courtesy of GENERAL MOTORS CORP.

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

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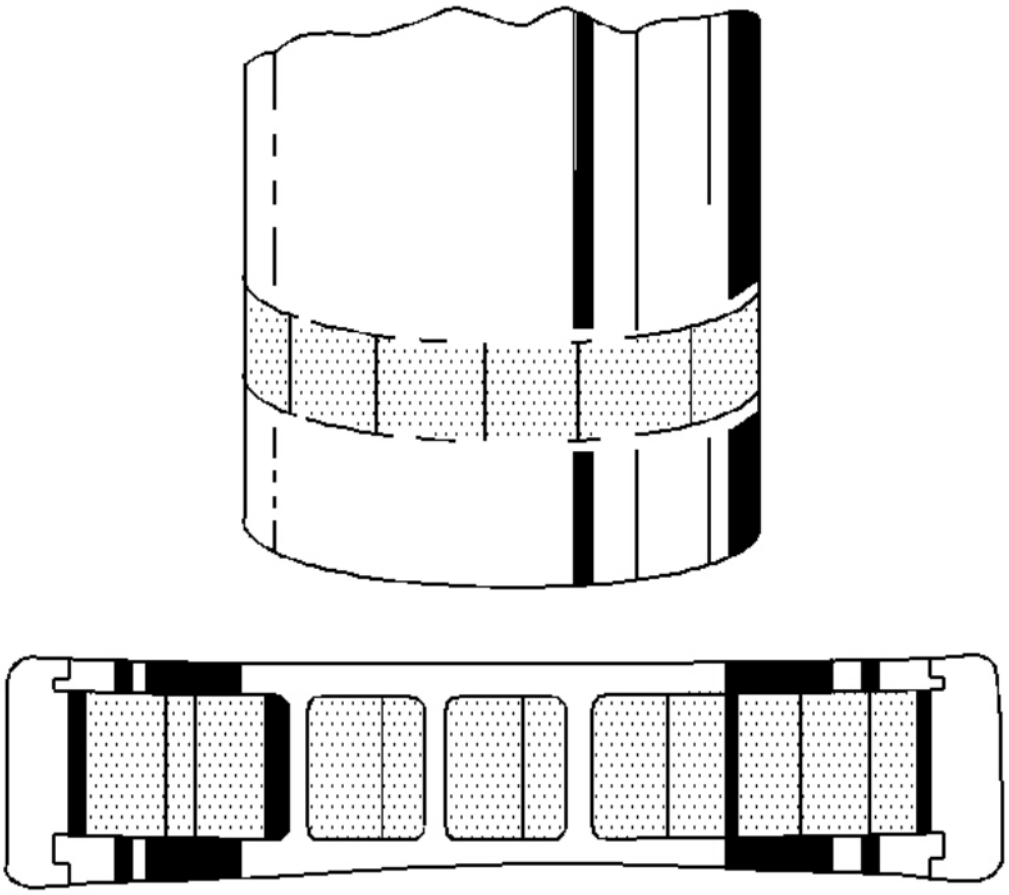


Fig. 23: Identifying Brinelling
Courtesy of GENERAL MOTORS CORP.

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

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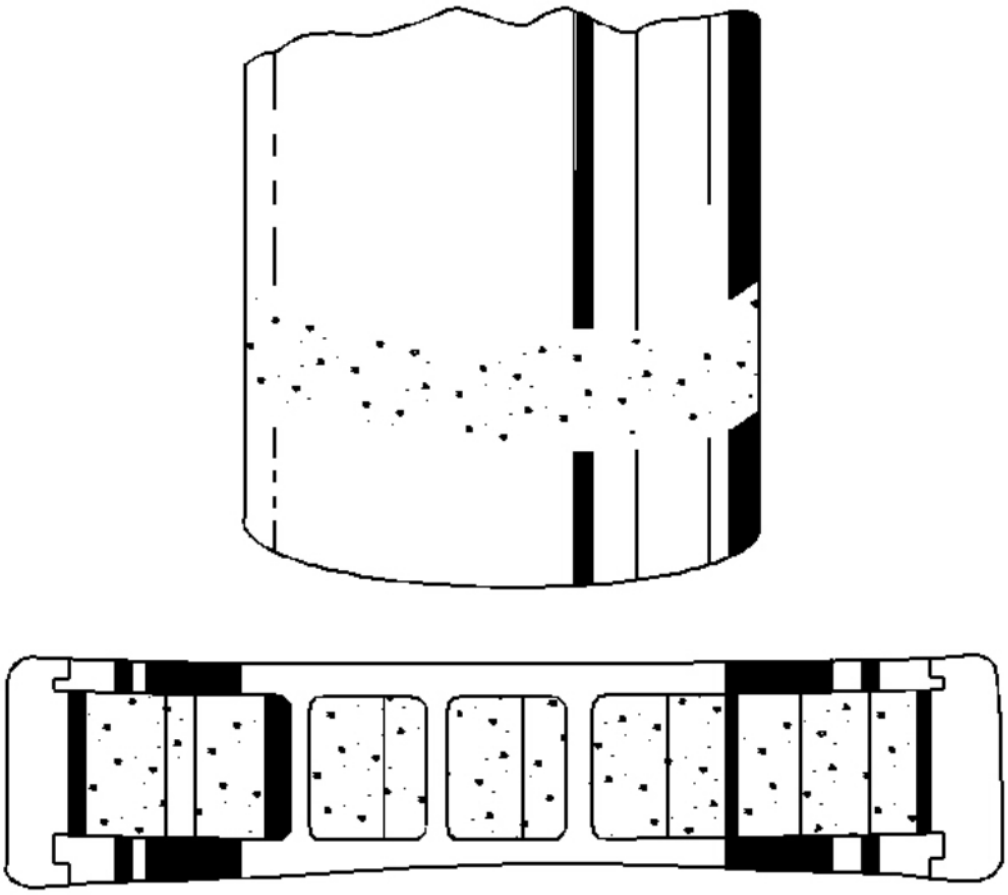


Fig. 24: Identifying Indentations
Courtesy of GENERAL MOTORS CORP.

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

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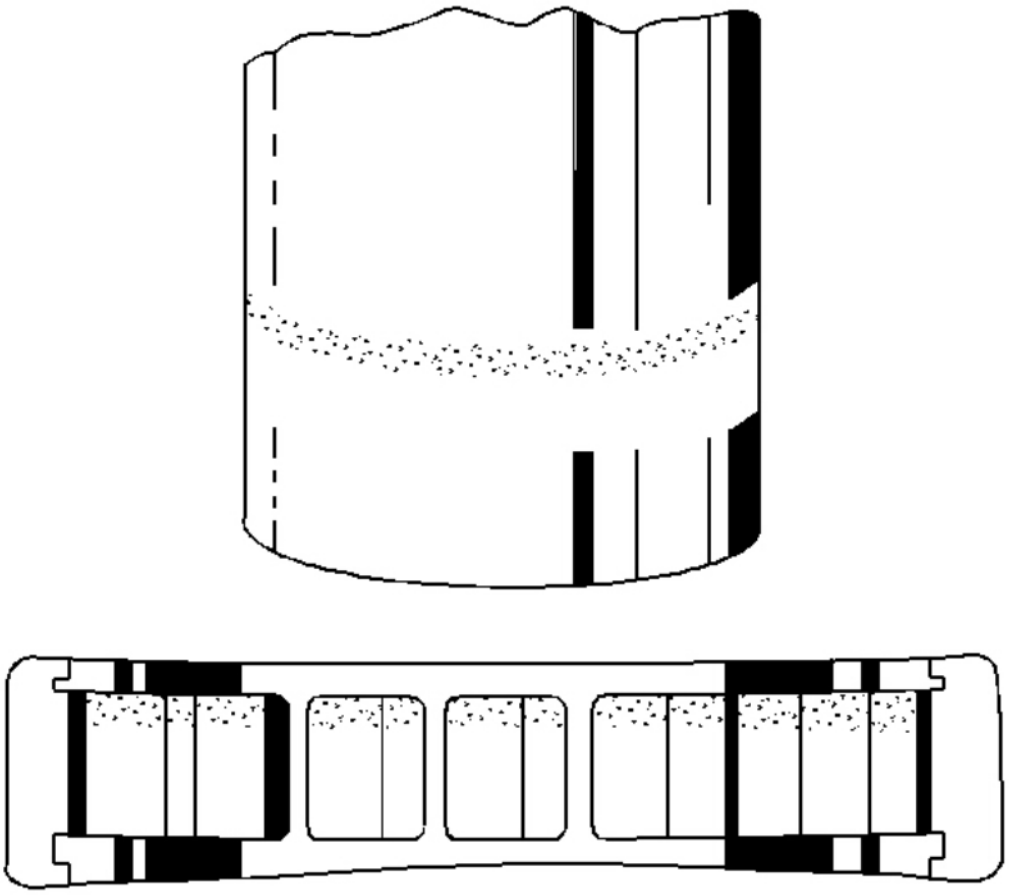


Fig. 25: Identifying Single Edge Pitting
Courtesy of GENERAL MOTORS CORP.

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

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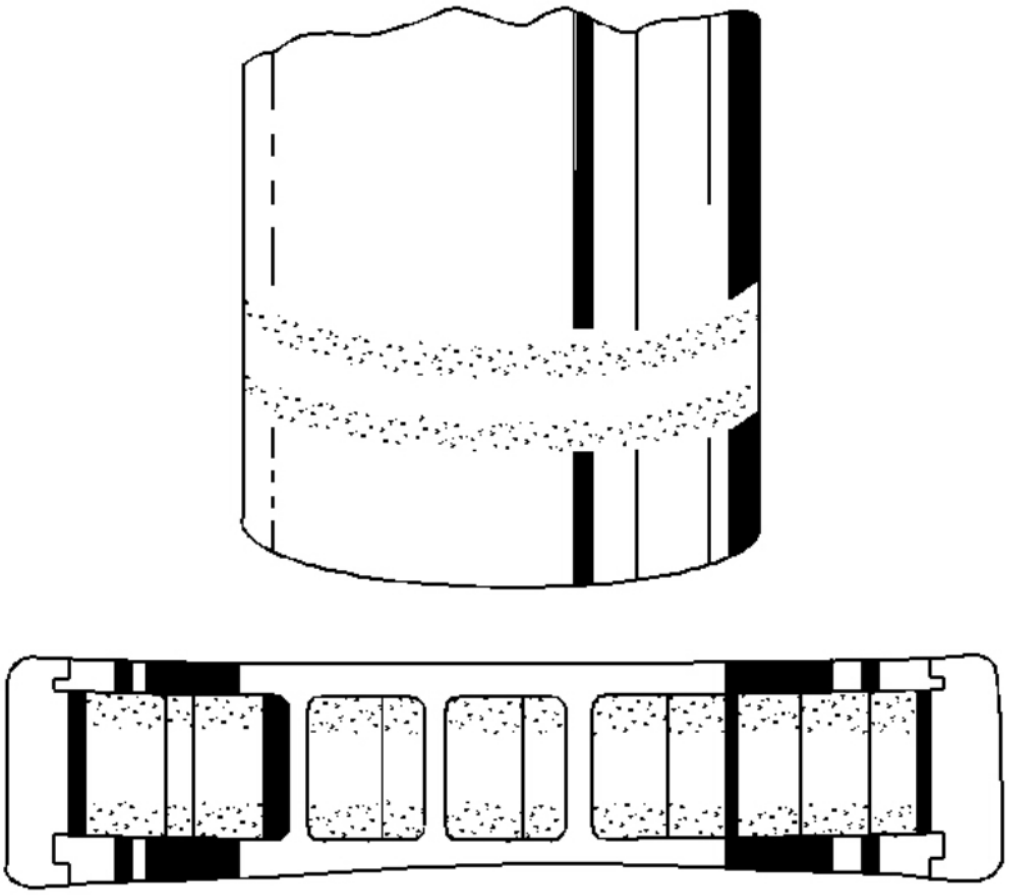


Fig. 26: Identifying Double Edge Pitting
Courtesy of GENERAL MOTORS CORP.

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

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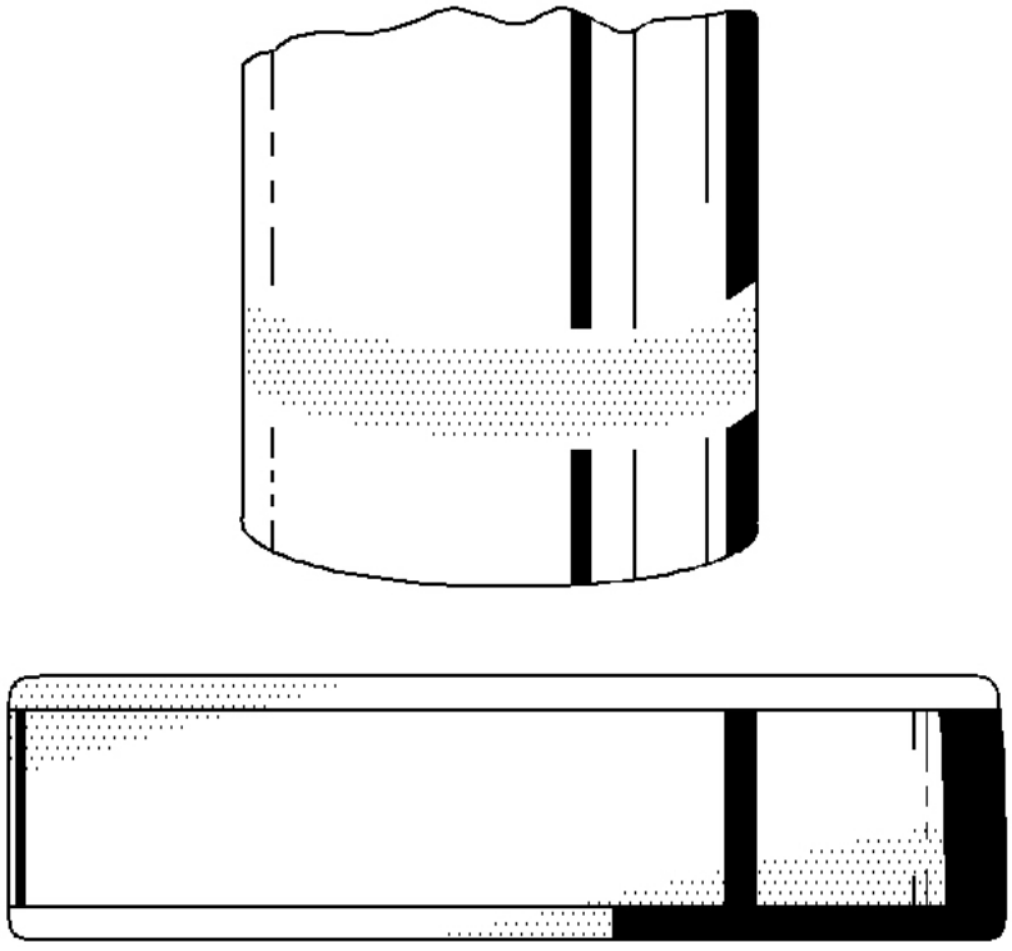


Fig. 27: Identifying Misalignment
Courtesy of GENERAL MOTORS CORP.

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

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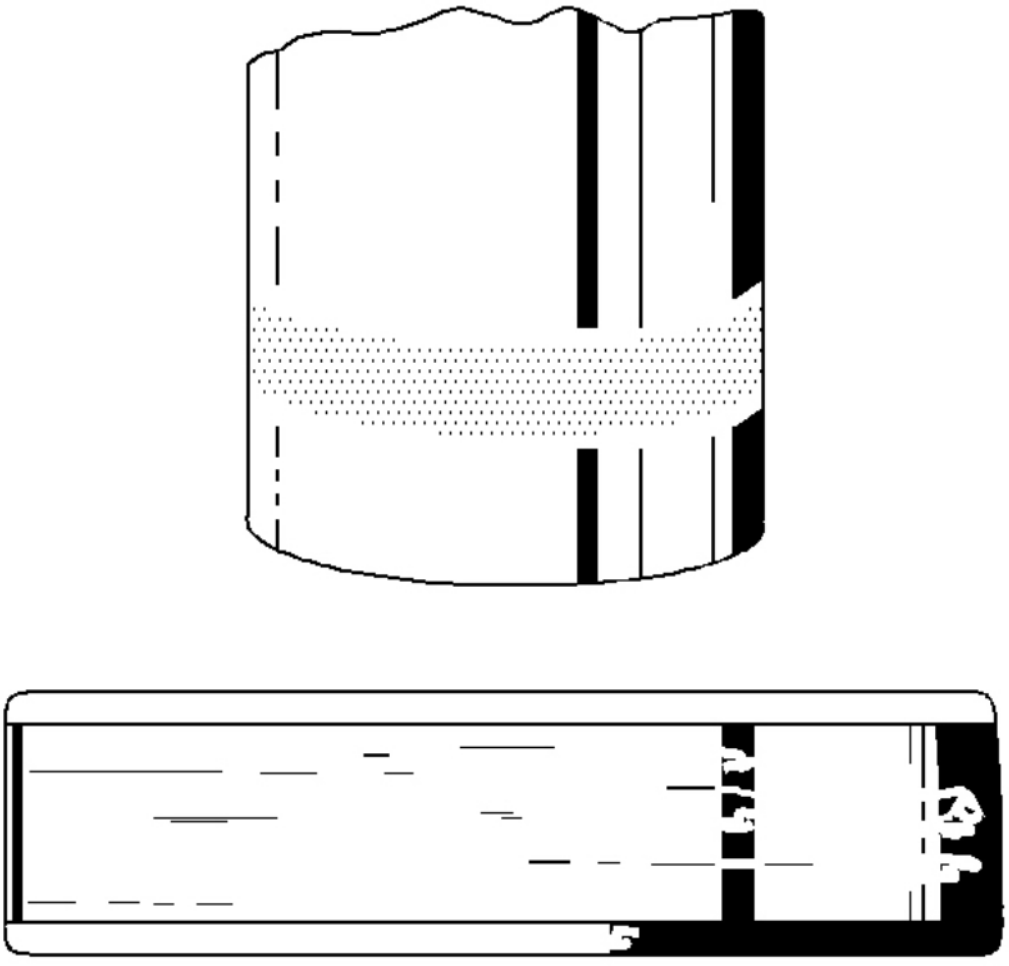


Fig. 28: Identifying Frettage
Courtesy of GENERAL MOTORS CORP.

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

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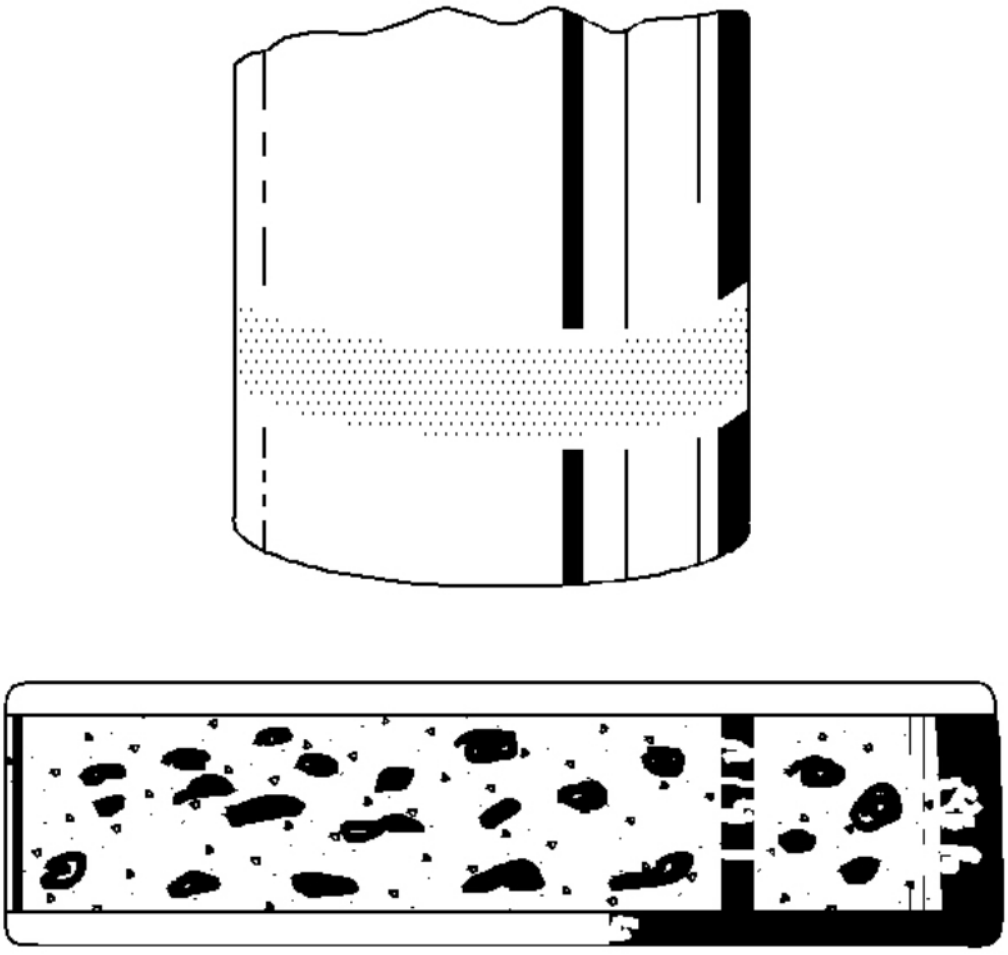


Fig. 29: Identifying Smears
Courtesy of GENERAL MOTORS CORP.

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.

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

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- 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

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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.

REPAIR INSTRUCTIONS

LUBRICANT LEVEL INSPECTION - REAR DRIVE AXLE (8.6 INCH AXLE)

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
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.
5. Remove the rear axle fill plug.

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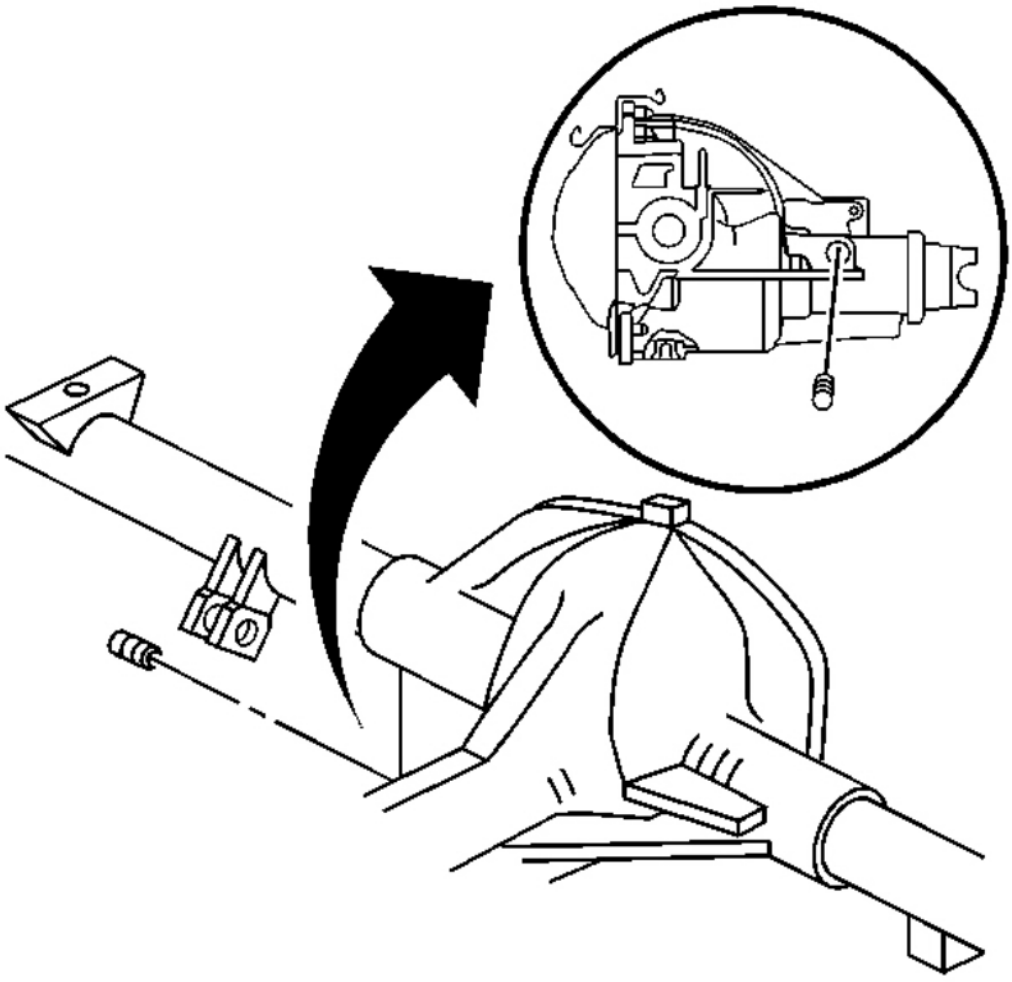


Fig. 30: View Of Rear Axle Fill Plug (8.6 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

6. Fabricate a dipstick from a pipe cleaner or similar item. Form the pipe cleaner into an "L".
7. Insert the pipe cleaner into the fill plug opening with the stem facing down.
8. Remove the pipe cleaner and measure the distance from the bend in the pipe cleaner to the lubricant level.

   Specification: The distance between the bend and the lubricant level should be 15-40 mm (0.6-1.6 in).

9. If the measurement is greater than 40 mm (1.6 in), add lubricant until the level is between 15-40 mm (0.6-1.6 in) from the bottom edge of the fill plug hole. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.

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NOTE: **Refer to Fastener Notice in Cautions and Notices.**

10. Install the rear axle fill plug.

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

11. Lower the vehicle.

LUBRICANT LEVEL INSPECTION - REAR DRIVE AXLE (9.5, 10.5 INCH AXLE)

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
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.
5. Remove the rear axle fill plug.

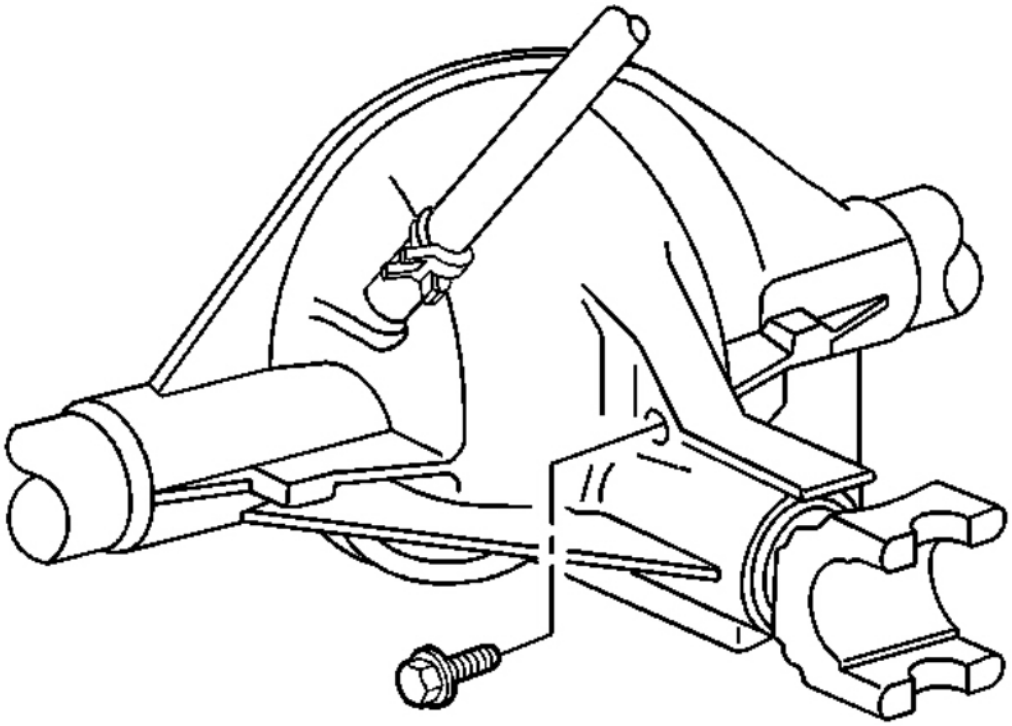


Fig. 31: View Of Rear Axle Fill Plug (9.5, 10.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

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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** in Maintenance and Lubrication.

   NOTE: Refer to Fastener Notice in Cautions and Notices.

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.

LUBRICANT LEVEL INSPECTION - REAR DRIVE AXLE (9.75 INCH AXLE)

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
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.
5. Remove the rear axle fill plug.

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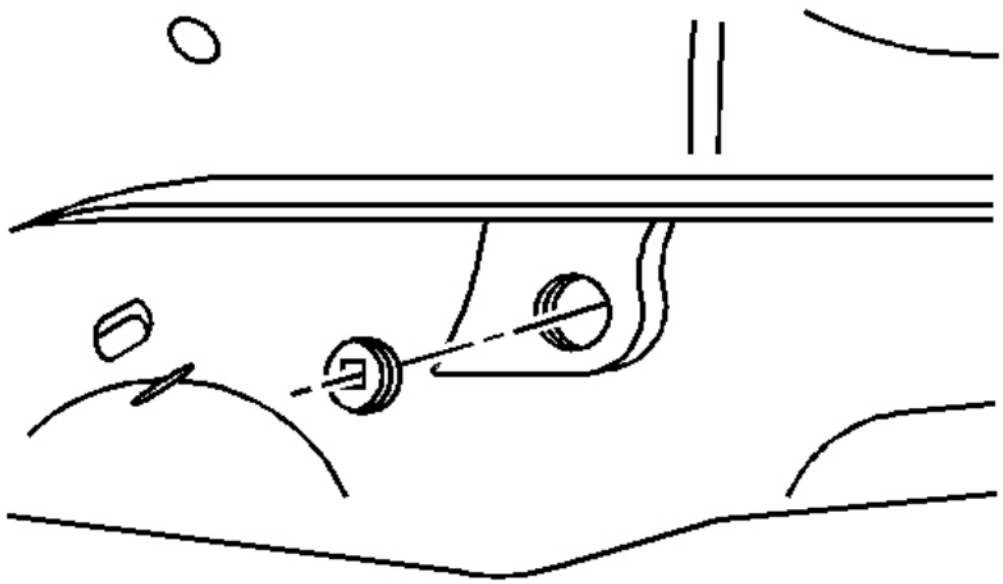


Fig. 32: View Of Rear Axle Fill Plug (9.75 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

6. Inspect the lubricant level.

   Specification: The lubricant level should be between 0-6 mm (0-0.25 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** in Maintenance and Lubrication.

   NOTE: Refer to Fastener Notice in Cautions and Notices.

8. Install the rear axle fill plug.

   Tighten: Tighten the rear axle fill plug to 21 N.m (15 lb ft).

9. Lower the vehicle.

LUBRICANT REPLACEMENT - REAR DRIVE AXLE (8.6 INCH AXLE)

Removal Procedure

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

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2. Remove the rear axle fill plug.

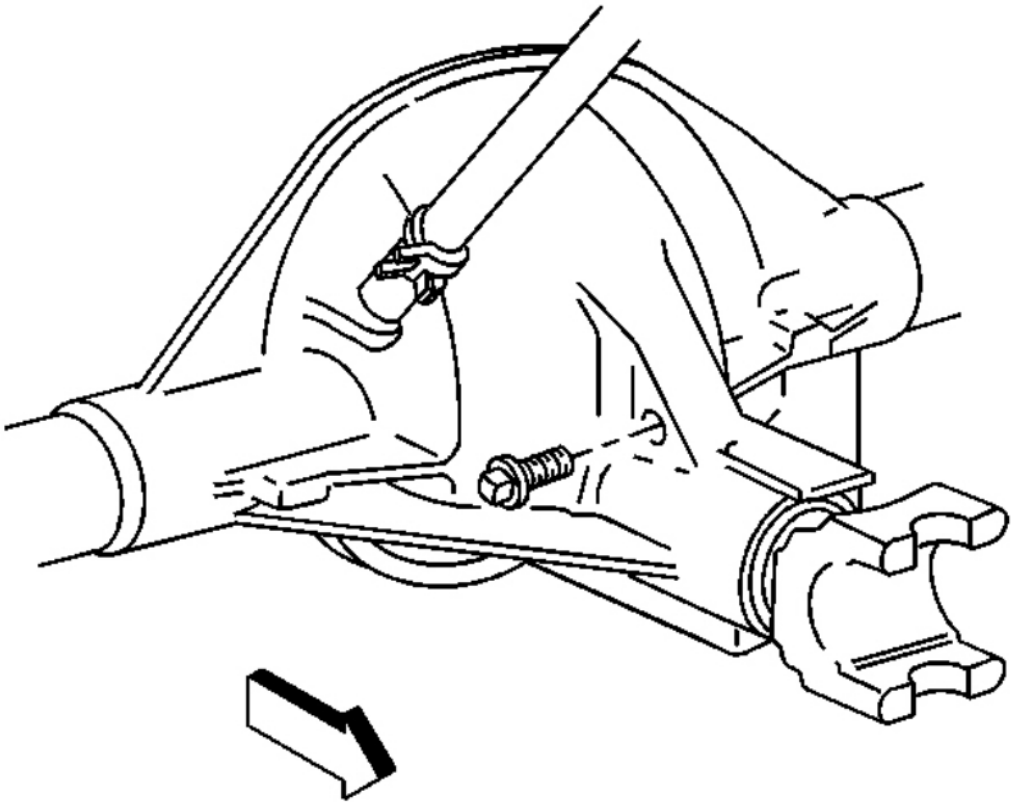


Fig. 33: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

3. Remove the rear axle housing cover bolts (1). Discard the rear axle housing cover bolts.
4. Carefully remove the rear axle housing cover (2) and drain the lubricant into a suitable container.

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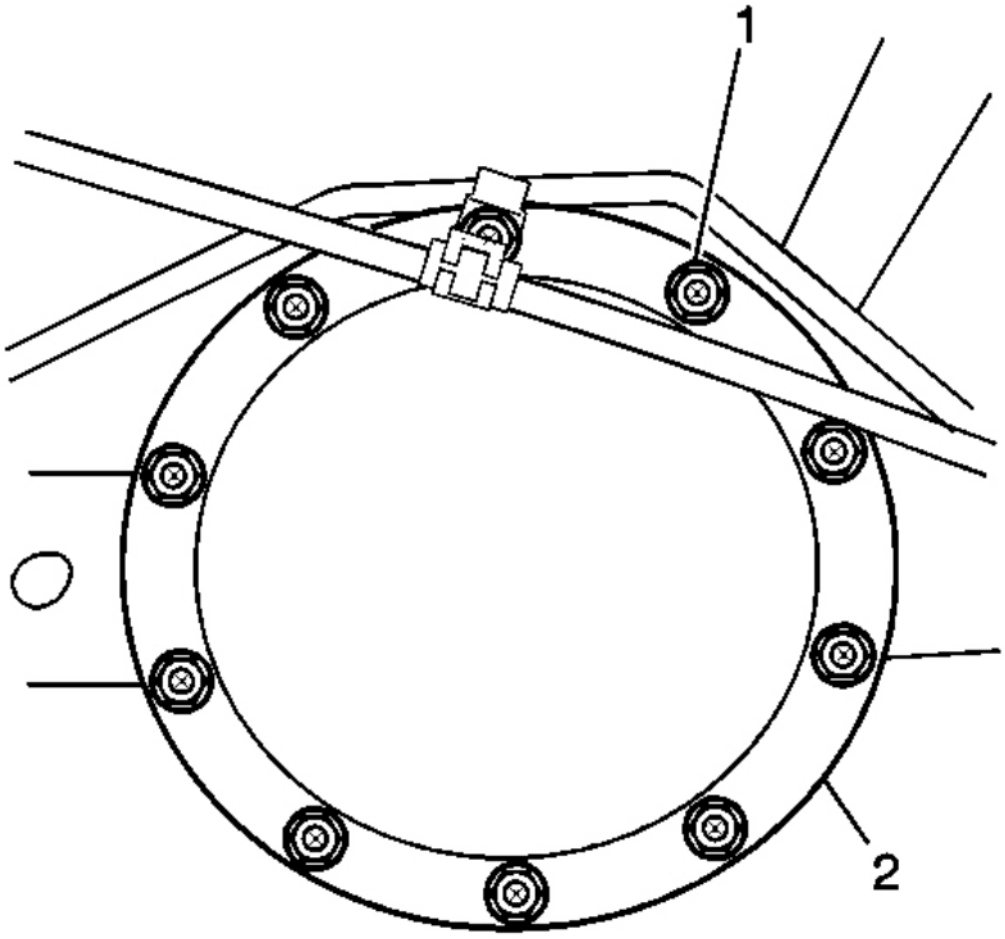


Fig. 34: Identifyng Rear Axle Housing Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove any gasket material from the rear axle housing and/or the rear axle housing cover.
6. Inspect the bottom of the rear axle housing for excessive metal particle accumulation. This accumulation is an indication of extreme wear.

Installation Procedure

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

NOTE: Refer to Fastener Notice in Cautions and Notices.

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

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

   Tighten: Tighten the bolts to 40 N.m (30 lb ft).

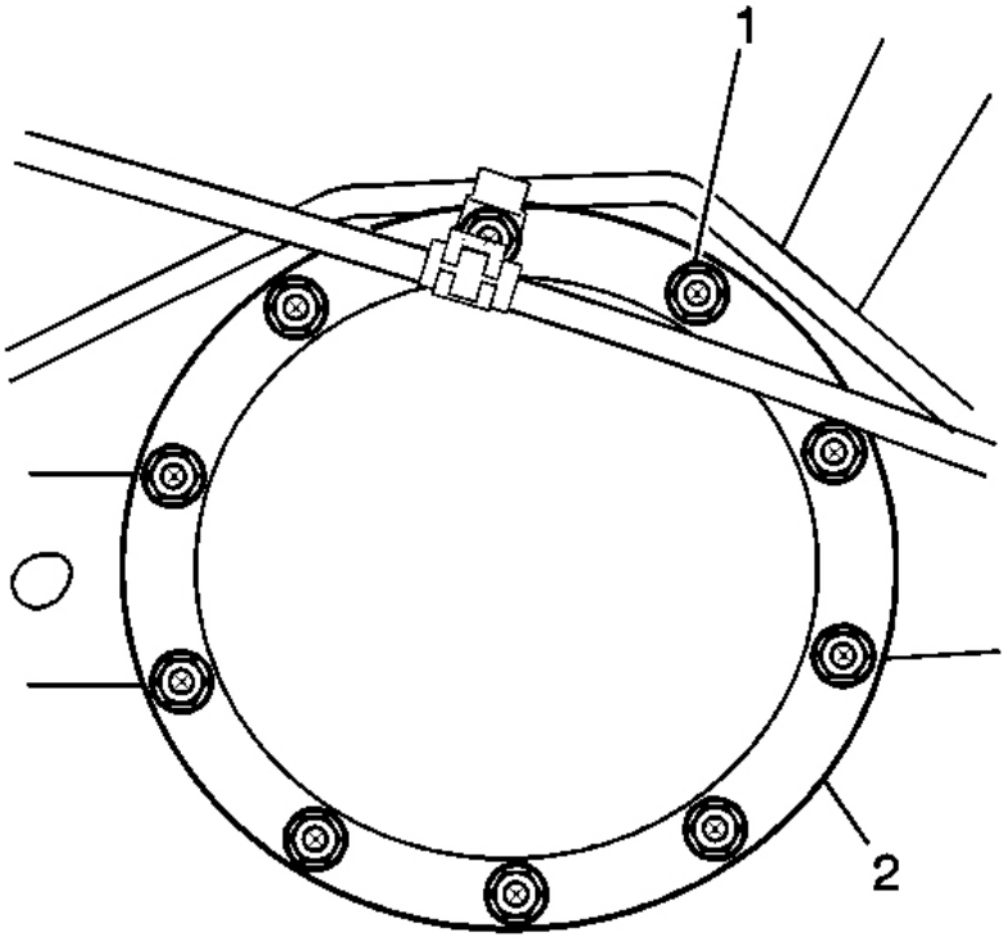


Fig. 35: Identifyng Rear Axle Housing Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

3. Fill the rear axle. Use the proper fluid. Refer to **Capacities - Approximate Fluid** and **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
4. Install the rear axle fill plug.

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

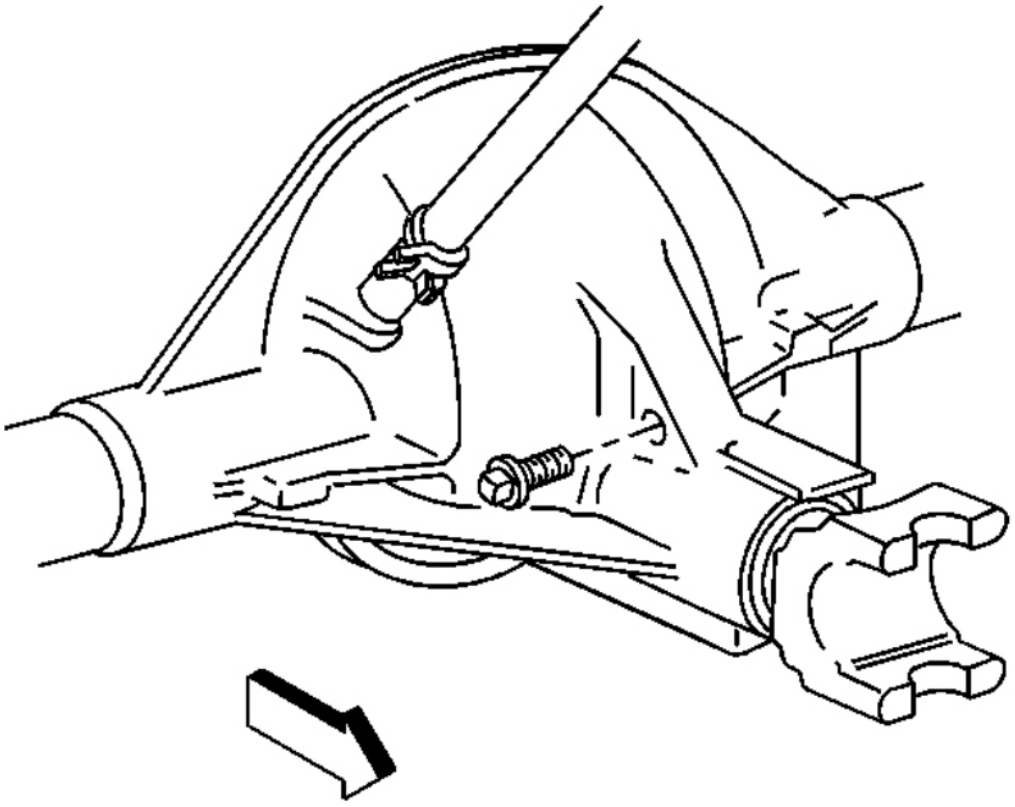


Fig. 36: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

5. Lower the vehicle.

LUBRICANT REPLACEMENT - REAR DRIVE AXLE (9.5, 10.5 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the rear axle fill plug.

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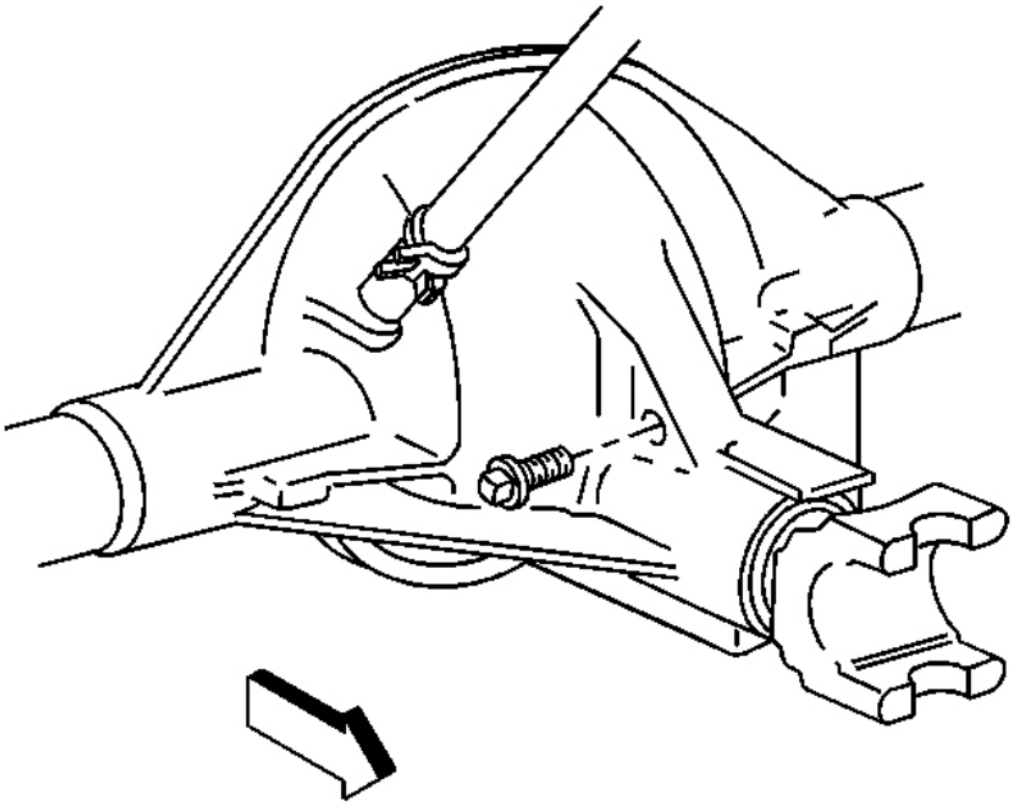


Fig. 37: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

3. Remove the rear axle drain plug.

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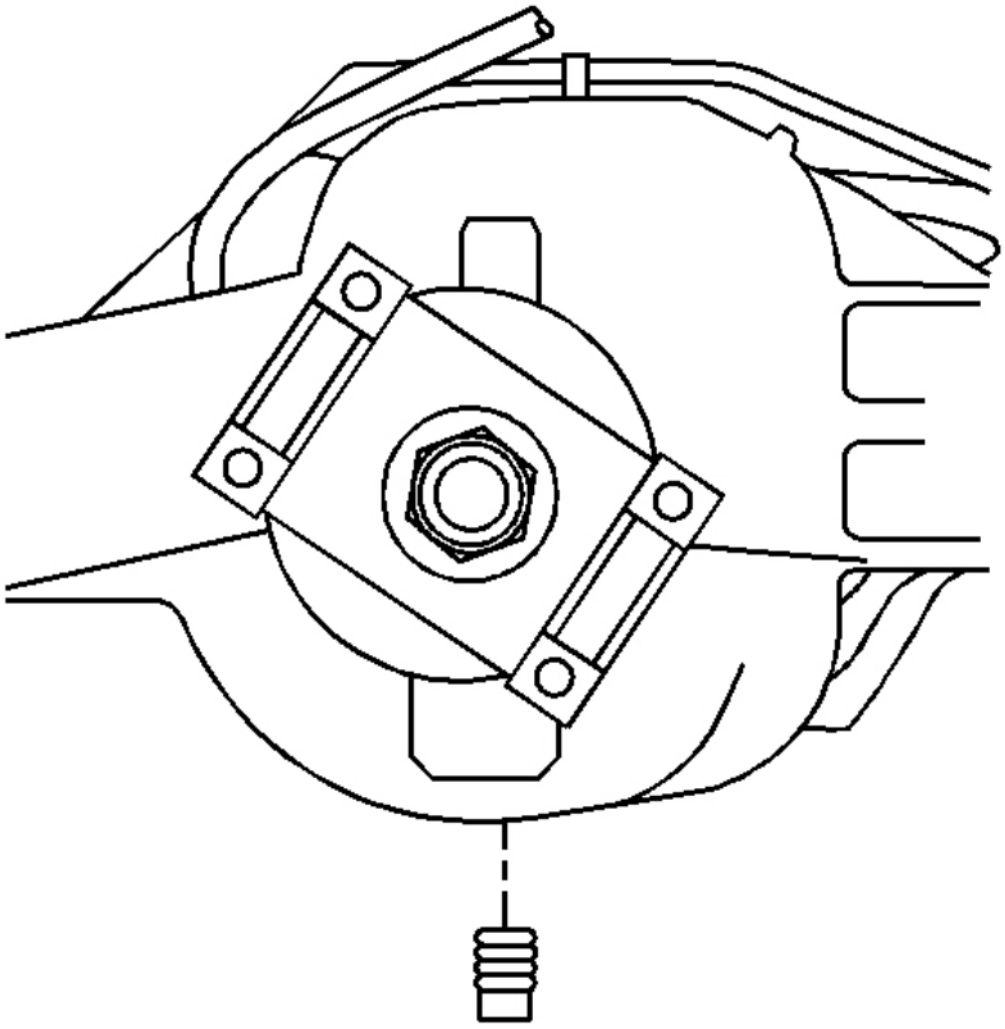


Fig. 38: Locating Rear Axle Drain Plug
Courtesy of GENERAL MOTORS CORP.

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

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NOTE: **Refer to Fastener Notice in Cautions and Notices.**

1. Install the rear axle drain plug.

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

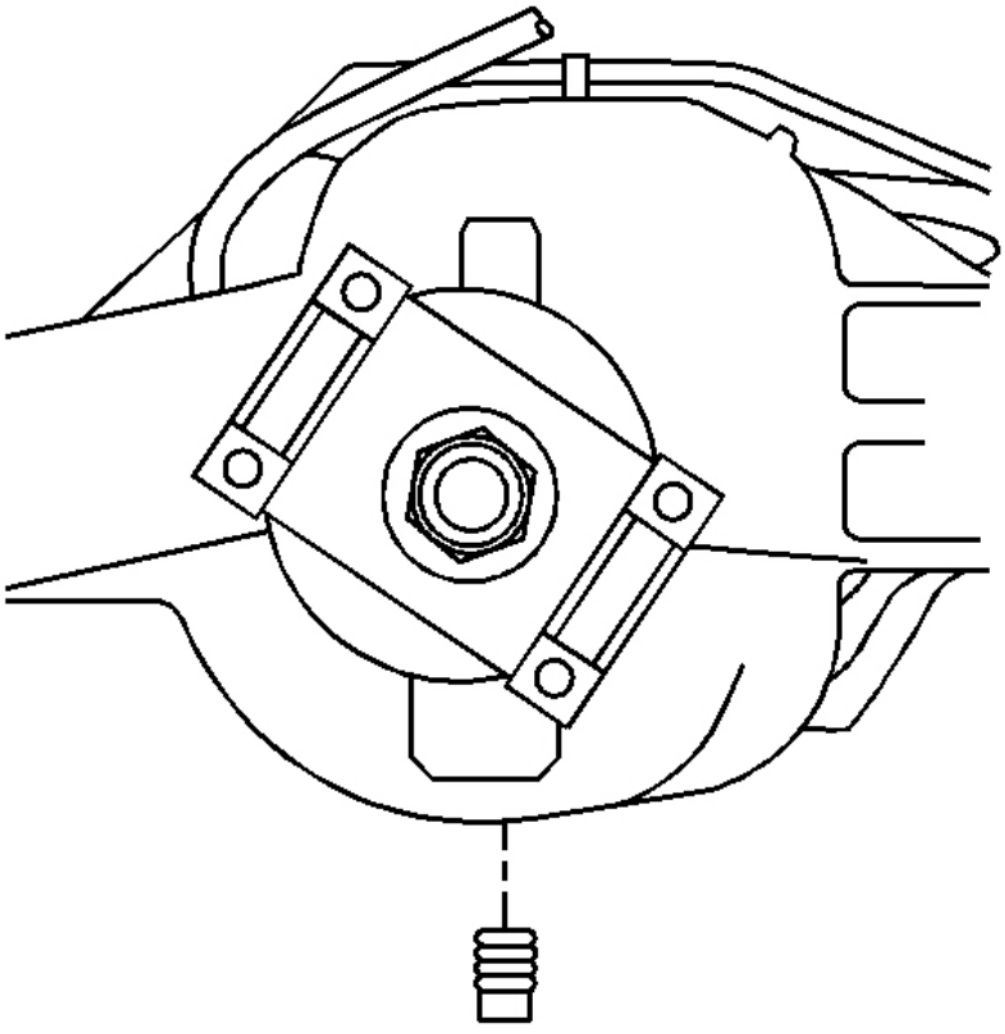


Fig. 39: Locating Rear Axle Drain Plug
Courtesy of GENERAL MOTORS CORP.

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

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3. Install the rear axle fill plug.

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

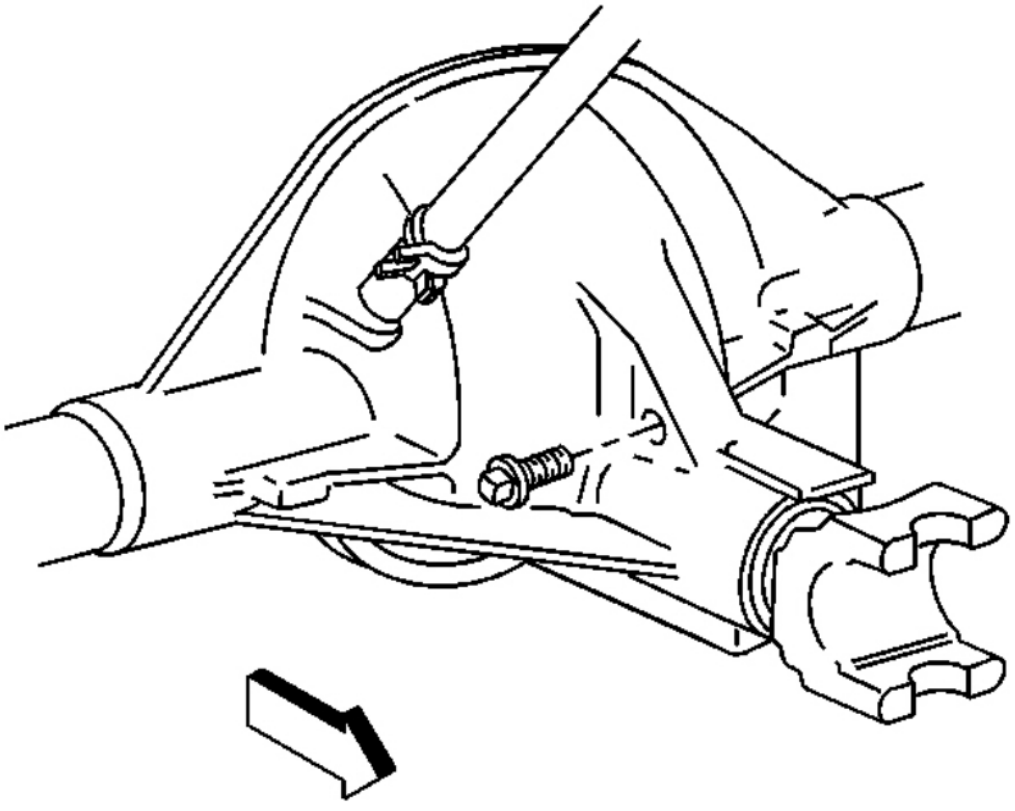


Fig. 40: View Of Rear Axle Fill Plug
Courtesy of GENERAL MOTORS CORP.

4. Lower the vehicle.

LUBRICANT REPLACEMENT - REAR DRIVE AXLE (9.75 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the rear axle fill plug.

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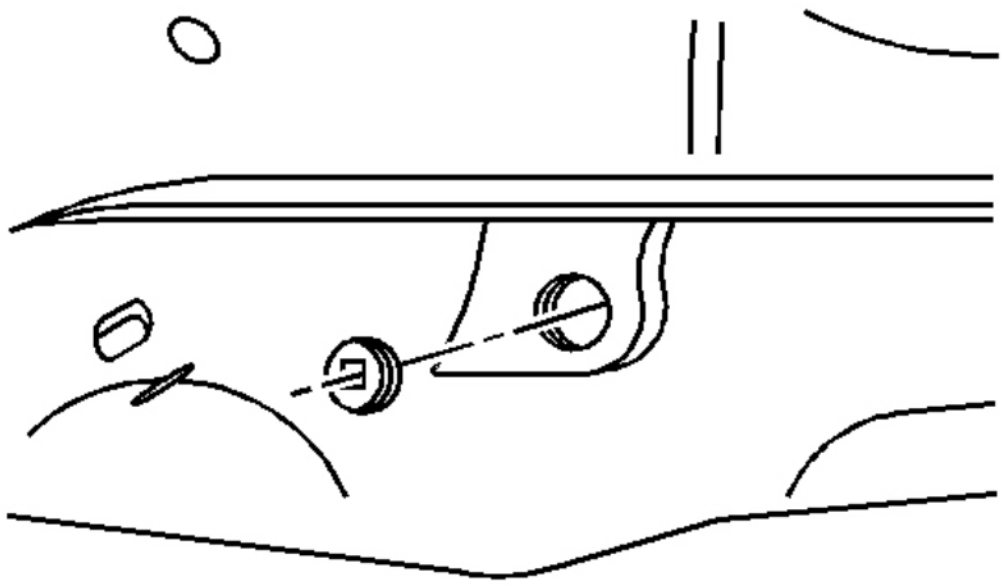


Fig. 41: View Of Rear Axle Fill Plug (9.75 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

3. Remove the rear axle drain plug.

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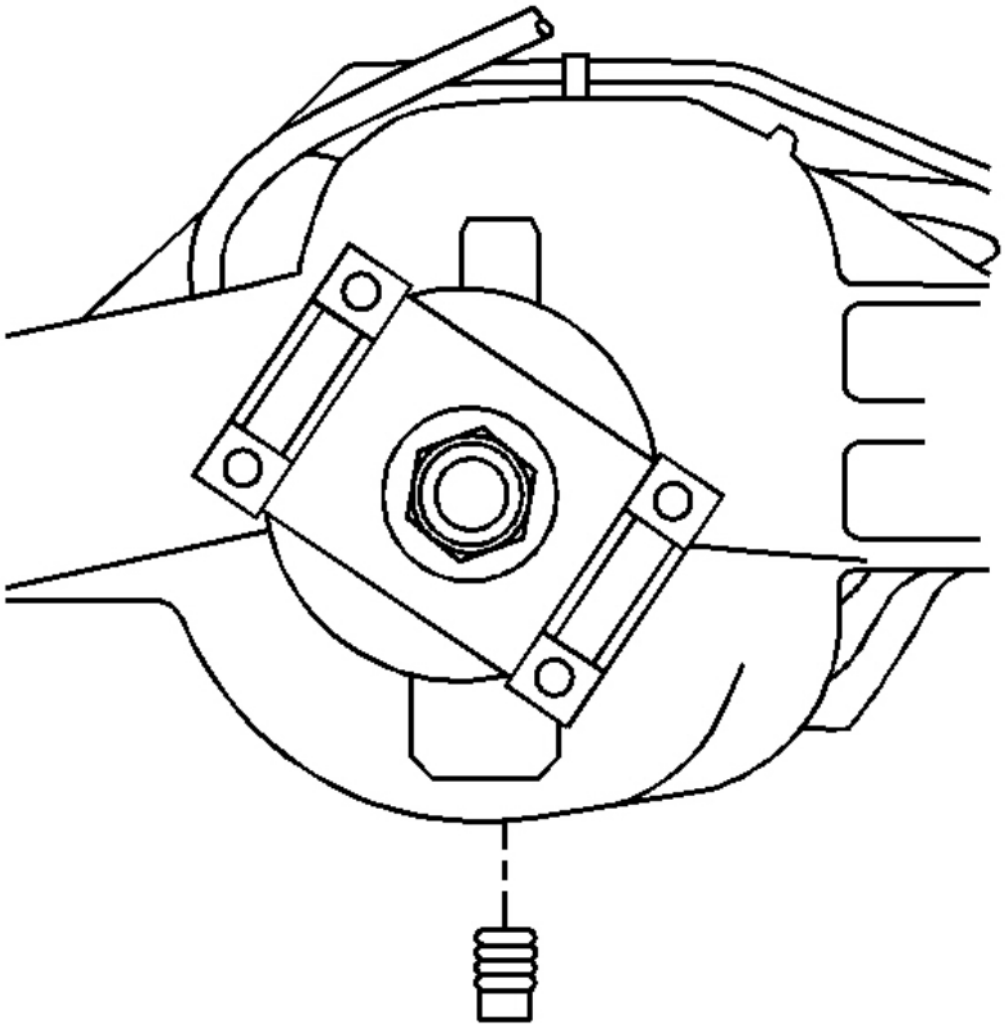


Fig. 42: Locating Rear Axle Drain Plug
Courtesy of GENERAL MOTORS CORP.

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

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NOTE: **Refer to Fastener Notice in Cautions and Notices.**

1. Install the rear axle drain plug.

   Tighten: Tighten the rear axle drain plug to 27 N.m (20 lb ft).

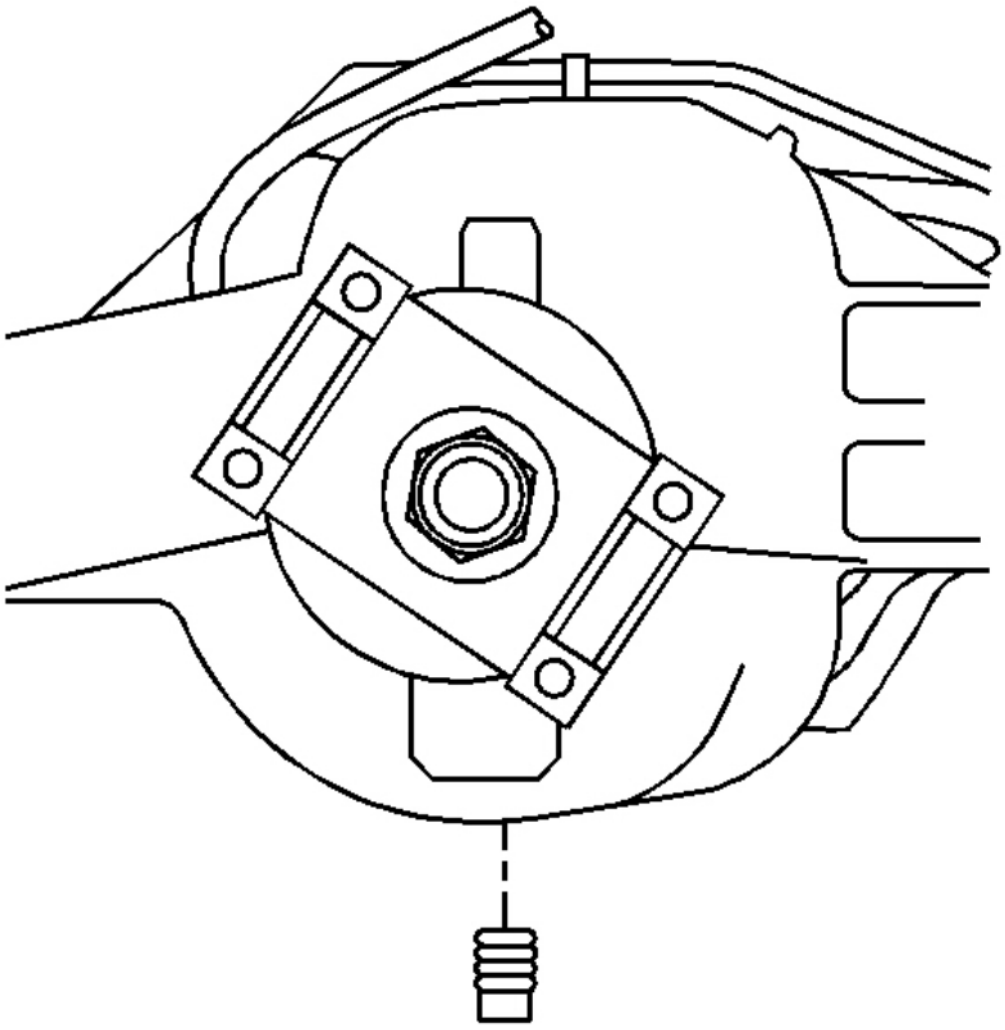


Fig. 43: Locating Rear Axle Drain Plug
Courtesy of GENERAL MOTORS CORP.

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

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3. Install the rear axle fill plug.

   Tighten: Tighten the rear axle fill plug to 21 N.m (15 lb ft).

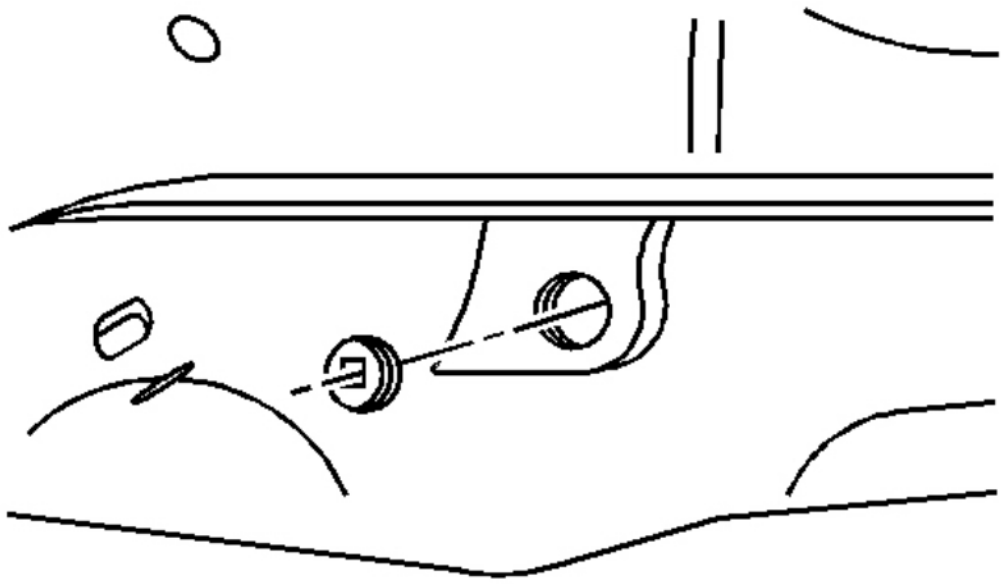


Fig. 44: View Of Rear Axle Fill Plug (9.75 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

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

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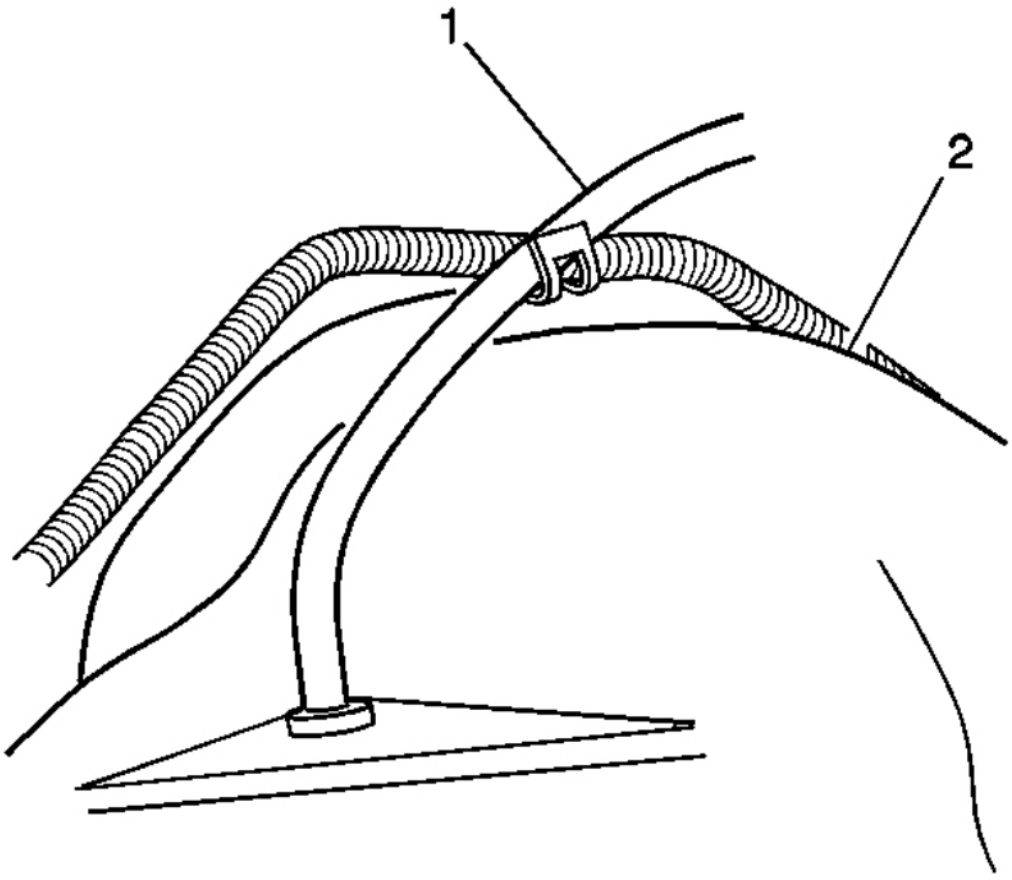


Fig. 45: View Of Vent Hose From Top Of Rear Axle
Courtesy of GENERAL MOTORS CORP.

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

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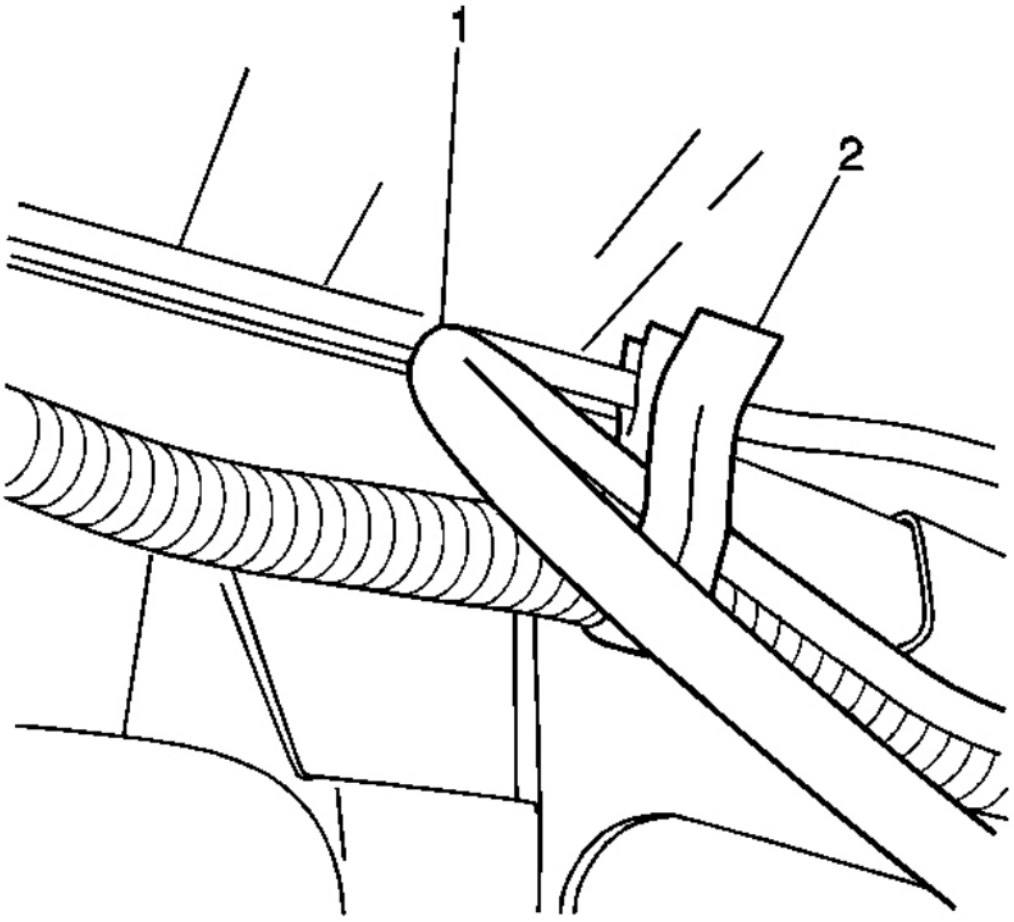


Fig. 46: View Of Vent Hose From Clip On Frame
Courtesy of GENERAL MOTORS CORP.

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

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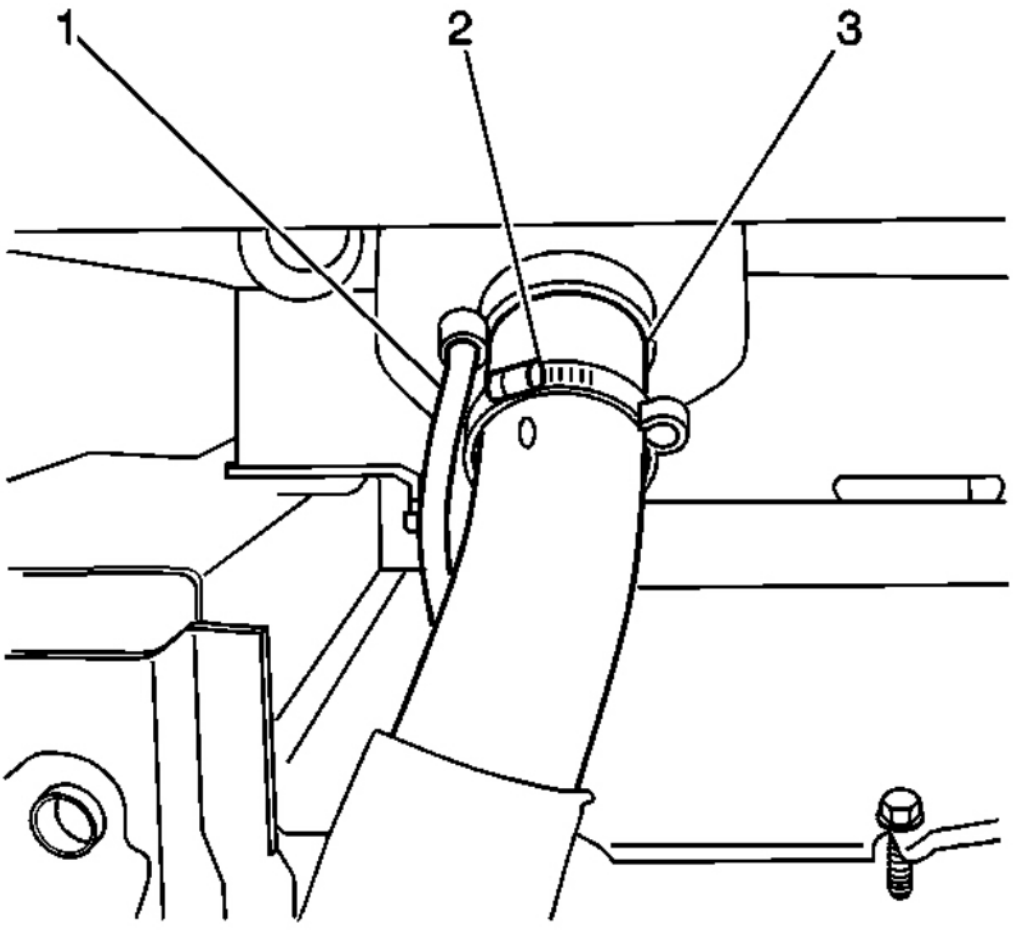


Fig. 47: View Of Vent Hose From Clamp On Filler Hose
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

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.

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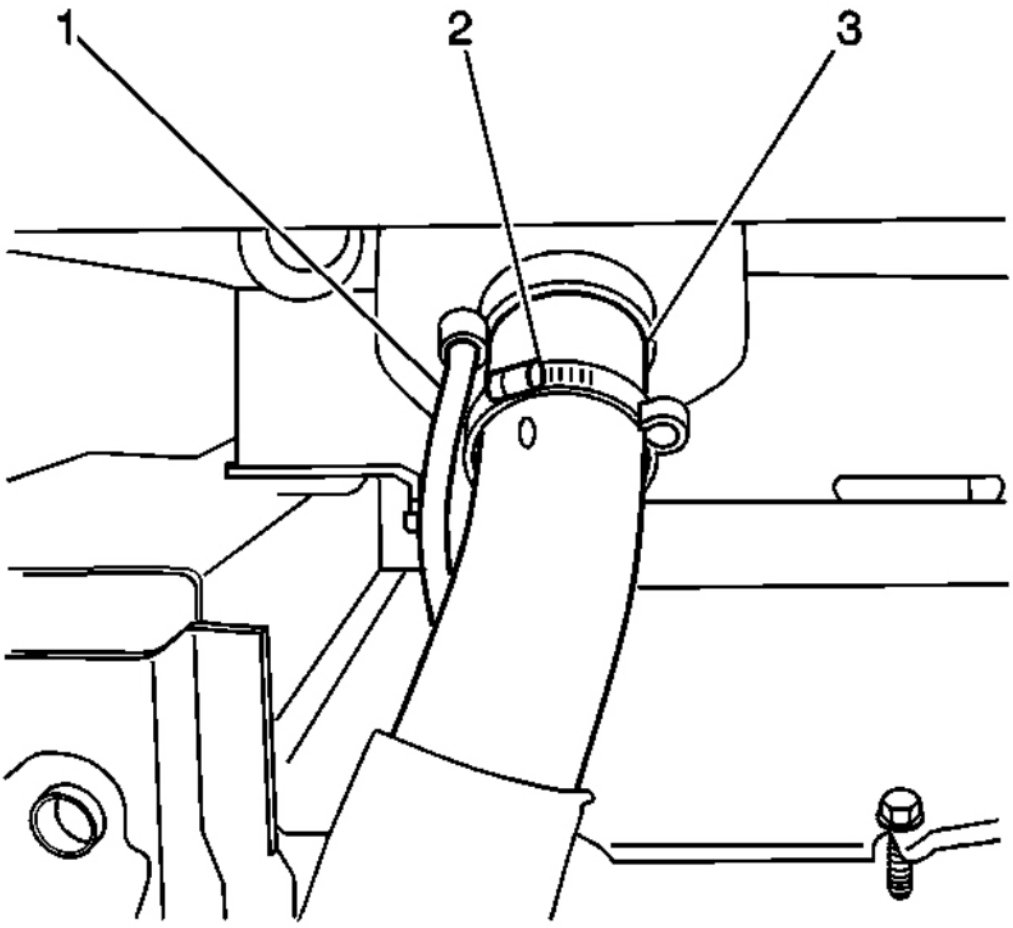


Fig. 48: View Of Vent Hose From Clamp On Filler Hose
Courtesy of GENERAL MOTORS CORP.

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

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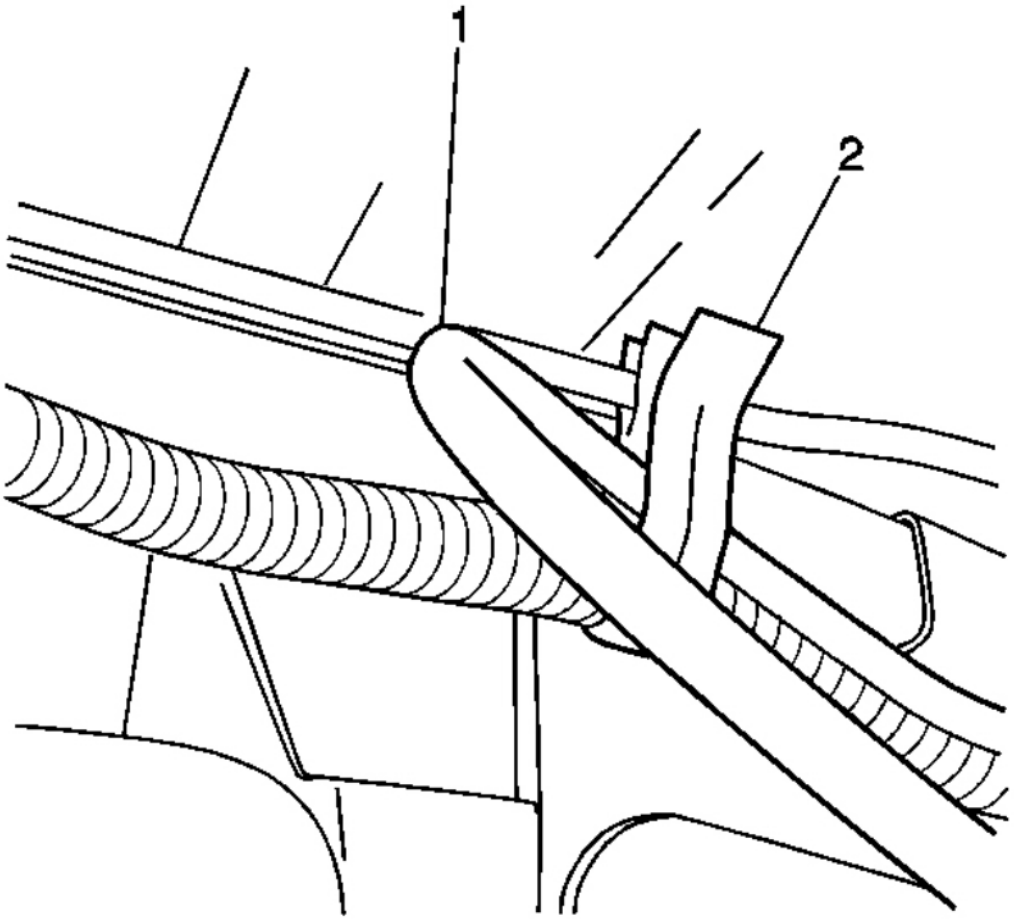


Fig. 49: View Of Vent Hose From Clip On Frame
Courtesy of GENERAL MOTORS CORP.

3. Install the vent hose (1) to the top of the rear axle (2).

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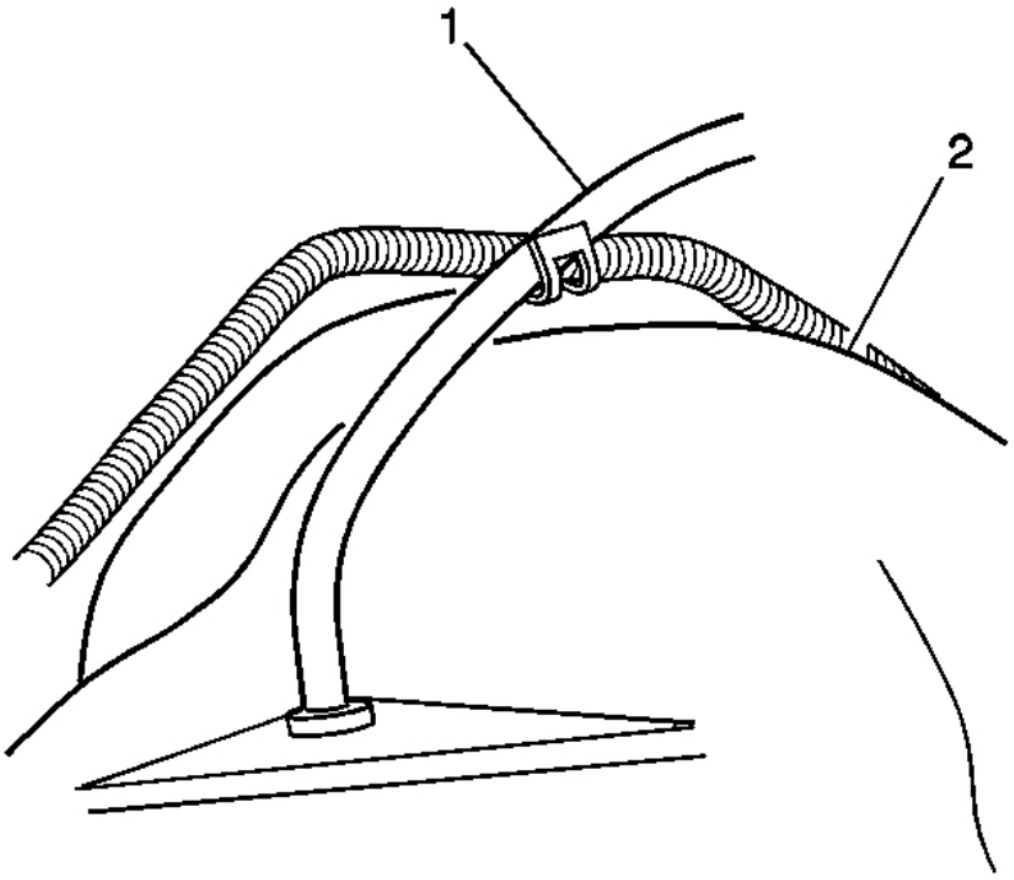


Fig. 50: View Of Vent Hose From Top Of Rear Axle
Courtesy of GENERAL MOTORS CORP.

4. Remove the supports and lower the vehicle.

REAR AXLE HOUSING COVER AND GASKET REPLACEMENT

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Drain the rear axle. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
3. Remove the rear axle housing cover bolts (1).

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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.

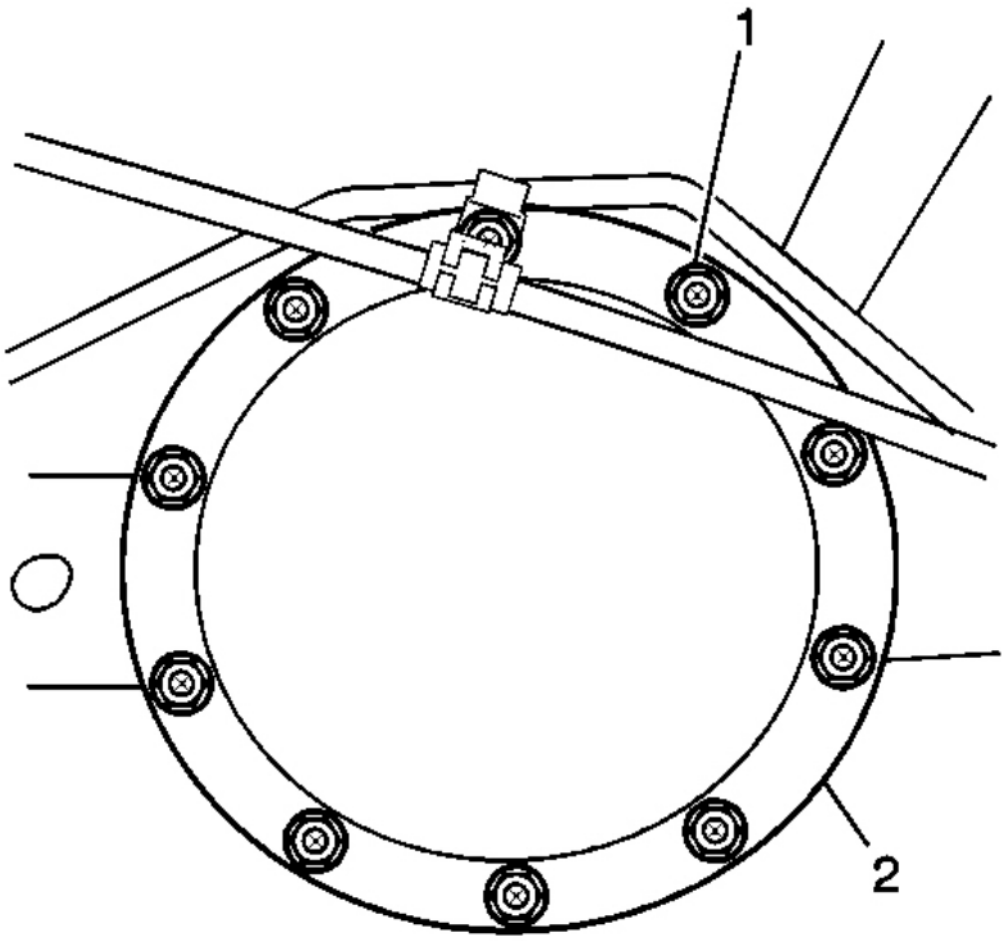


Fig. 51: Identifyng Rear Axle Housing Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

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

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NOTE: **Refer to Fastener Notice in Cautions and Notices.**

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).

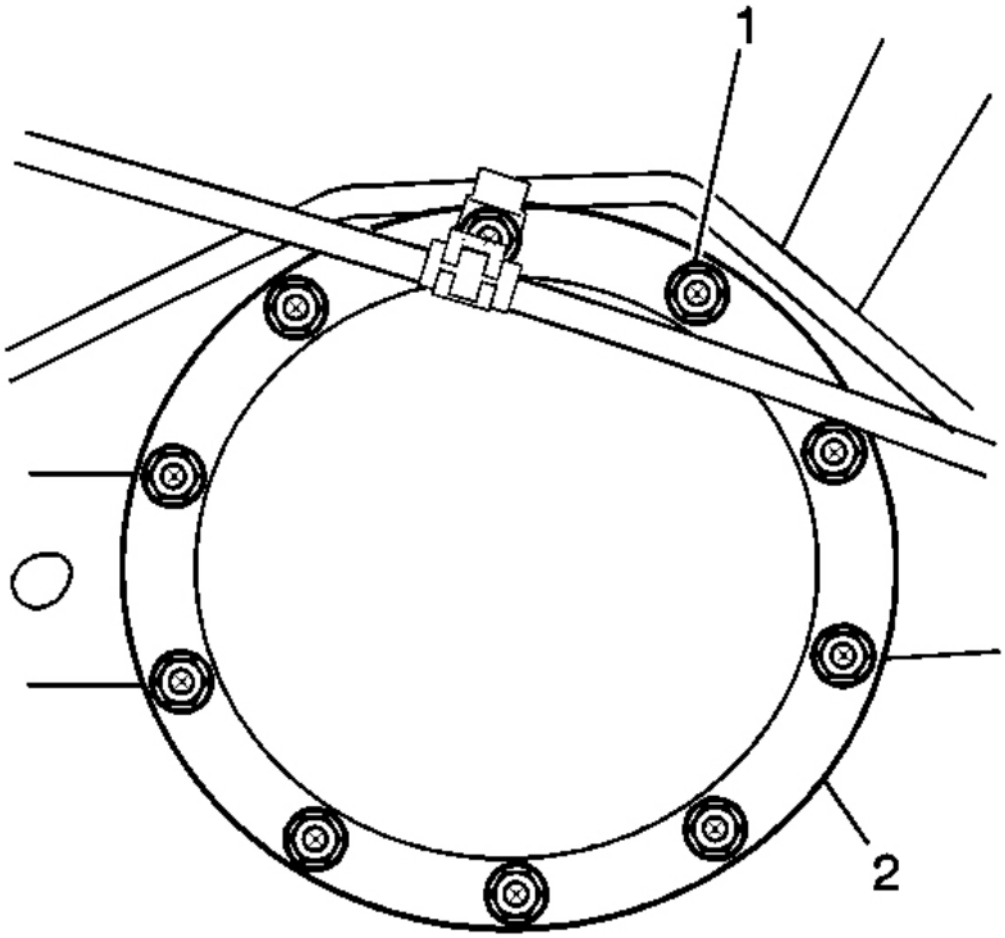


Fig. 52: Identifyng Rear Axle Housing Cover & Bolts
Courtesy of GENERAL MOTORS CORP.

3. Fill the rear axle. Use the proper fluid. Refer to **Capacities - Approximate Fluid** and **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.

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4. Lower the vehicle.

REAR AXLE SHAFT REPLACEMENT (8.6 INCH AXLE W/O JL4, 9.5 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Remove the brake caliper. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
4. Remove the rear cover and the gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
5. Remove the pinion shaft locking bolt.

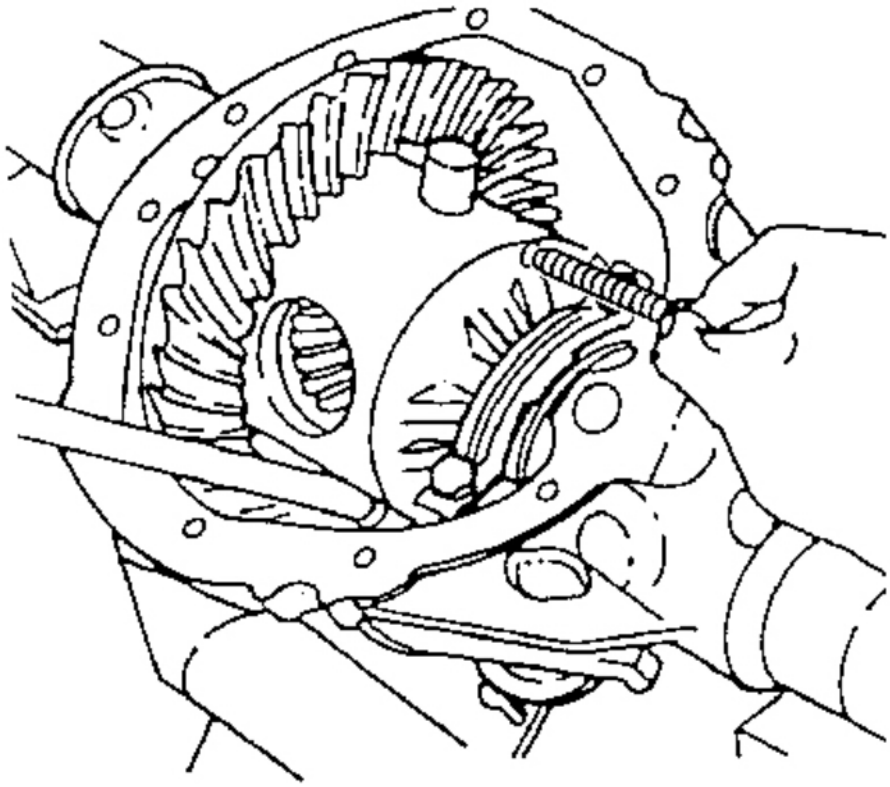


Fig. 53: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

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

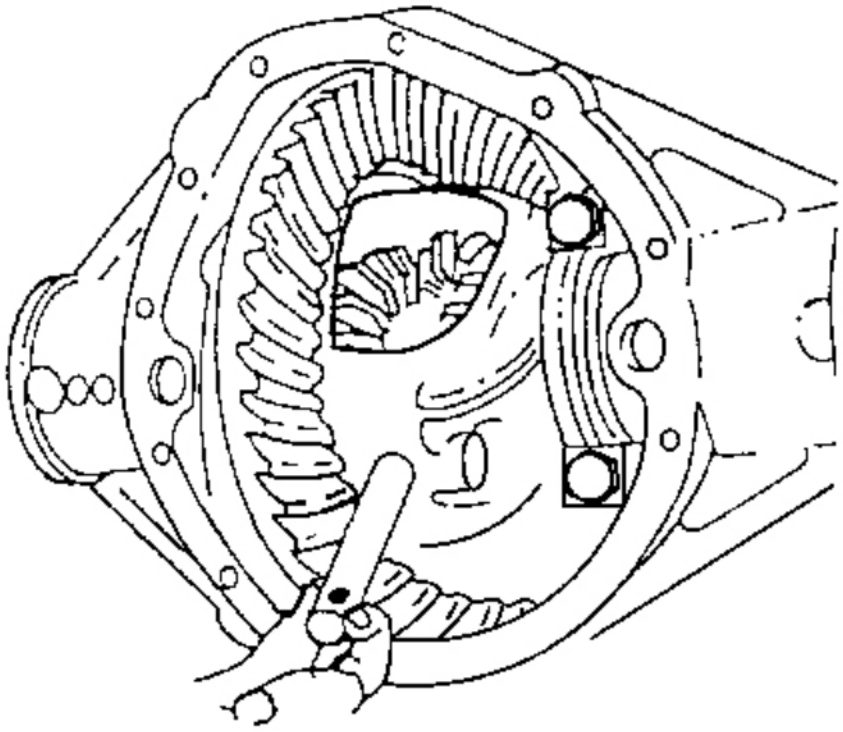


Fig. 54: View Of Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

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

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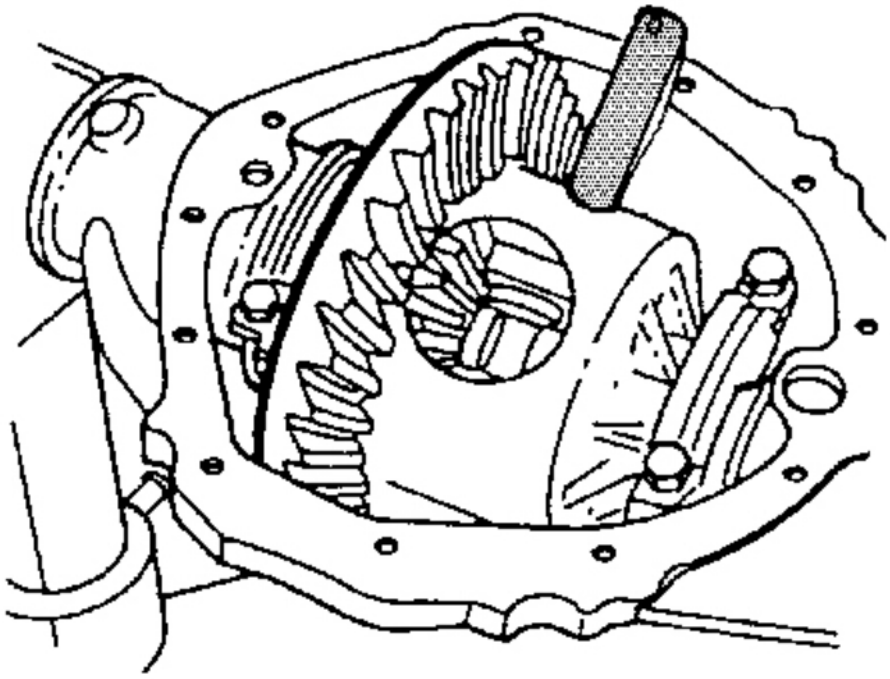


Fig. 55: Pinion Shaft Contacting Axle Housing Top
Courtesy of GENERAL MOTORS CORP.

8. 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).

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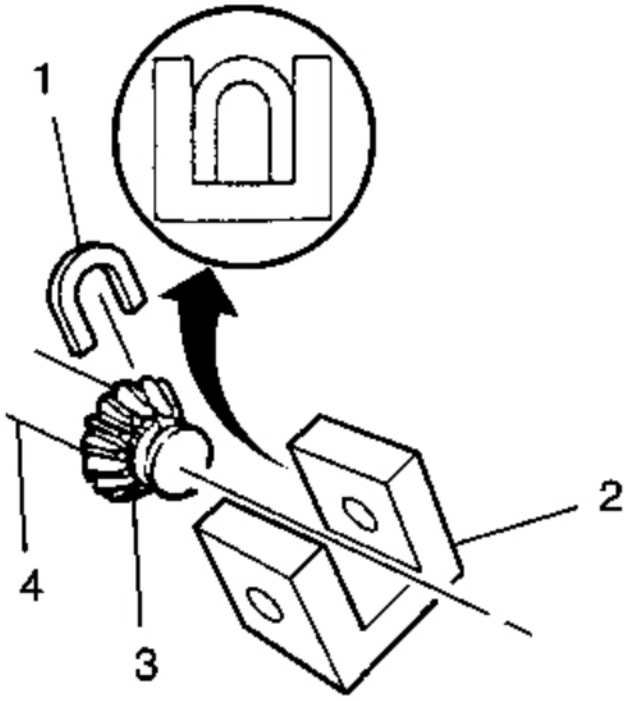


Fig. 56: View Of Axle Shaft, Lock & Thrust Block
Courtesy of GENERAL MOTORS CORP.

9. Push the flange of the axle shaft (1) toward the differential.
10. 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.

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

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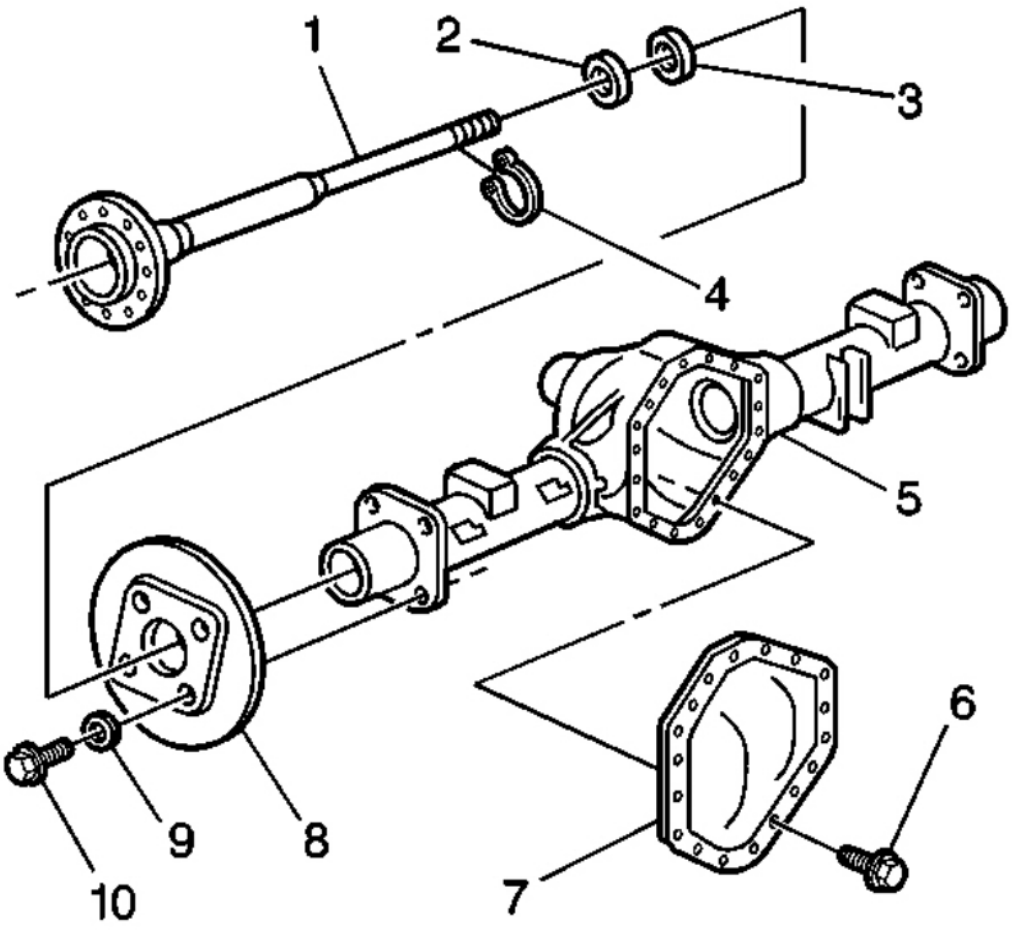


Fig. 57: Axle Shaft Housing & Components
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

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.

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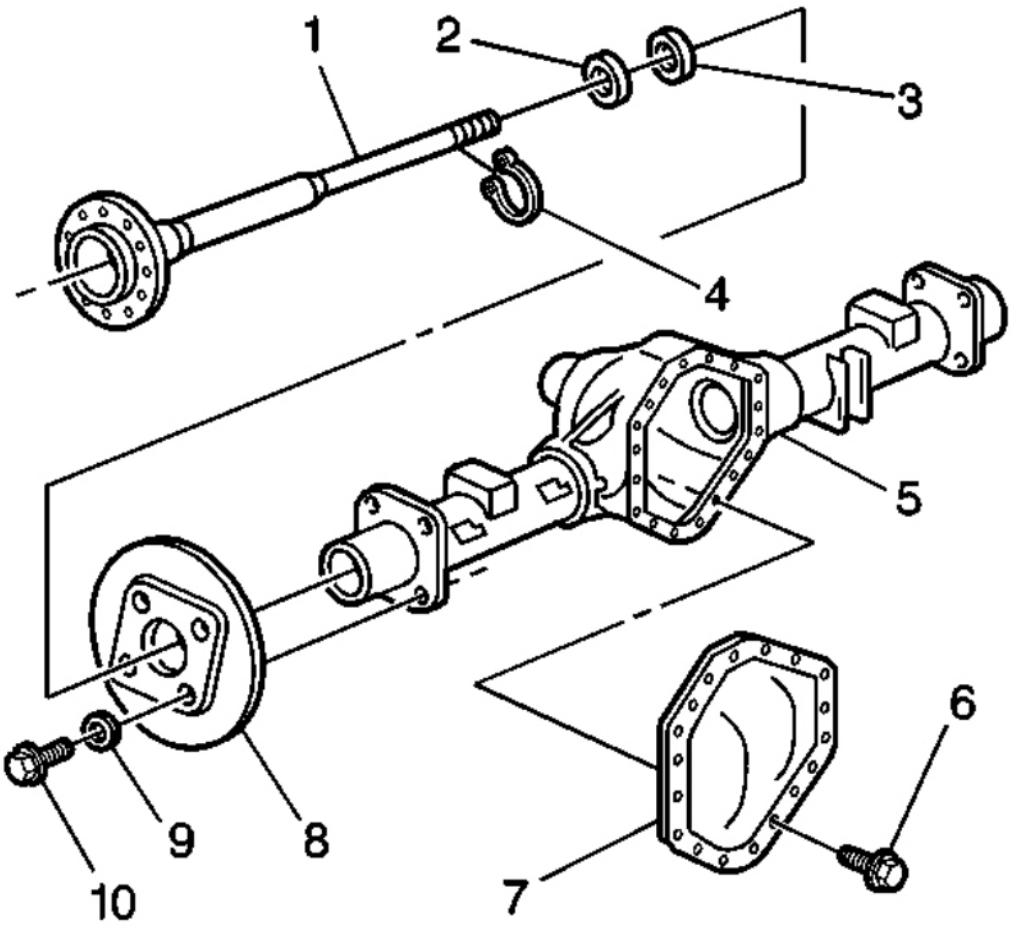


Fig. 58: Axle Shaft Housing & Components
Courtesy of GENERAL MOTORS CORP.

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.

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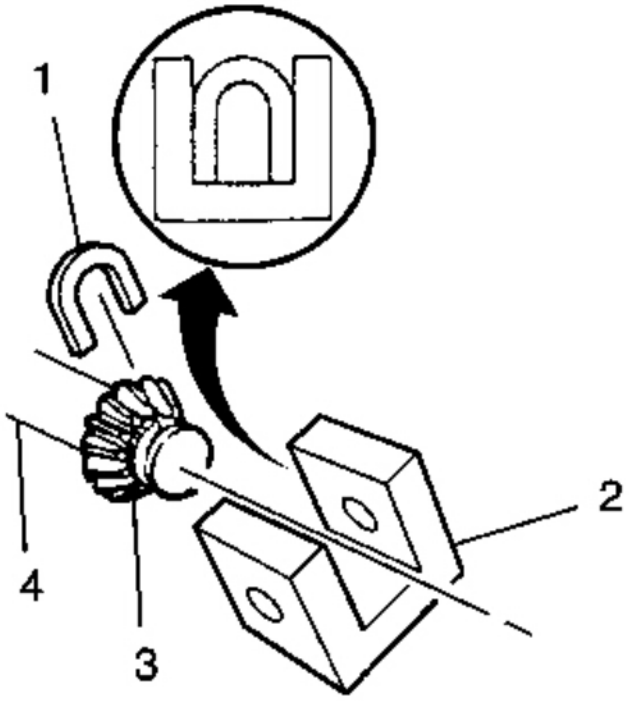


Fig. 59: View Of Axle Shaft, Lock & Thrust Block
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice in Cautions and Notices.

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 inch axle, tighten the pinion shaft locking bolt to 50 N.m (37 lb ft).

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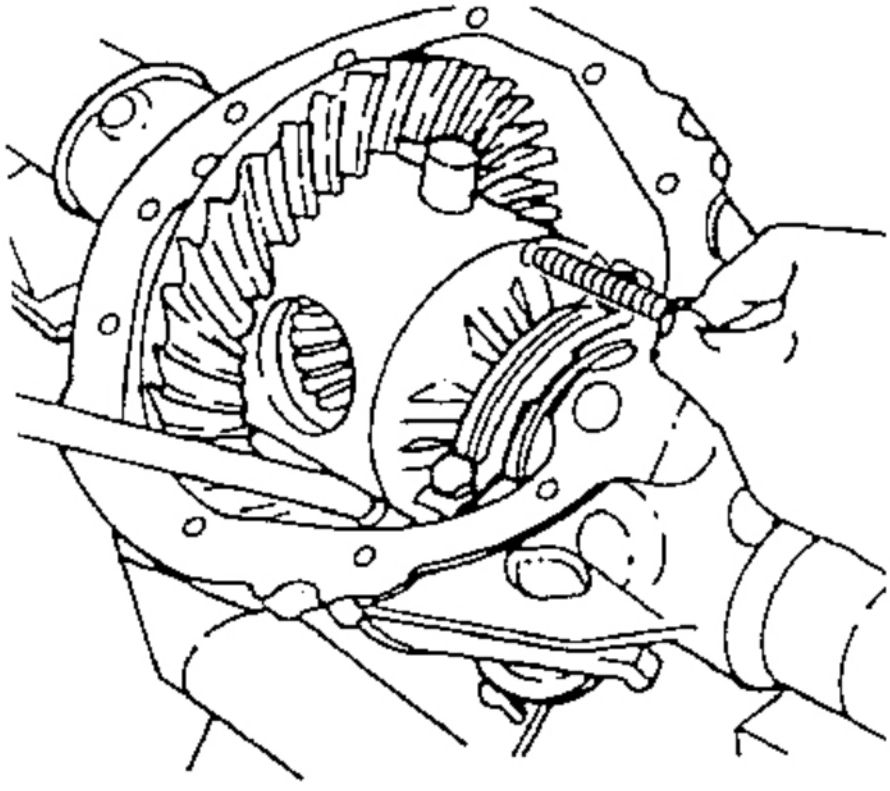


Fig. 60: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

9. Install the rear cover and the gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
10. Install the brake caliper. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
11. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
12. Fill the rear axle. Use the proper fluid. Refer to **Capacities - Approximate Fluid** and **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
13. Lower the vehicle.

REAR AXLE SHAFT REPLACEMENT (8.6 INCH AXLE W/JL4)

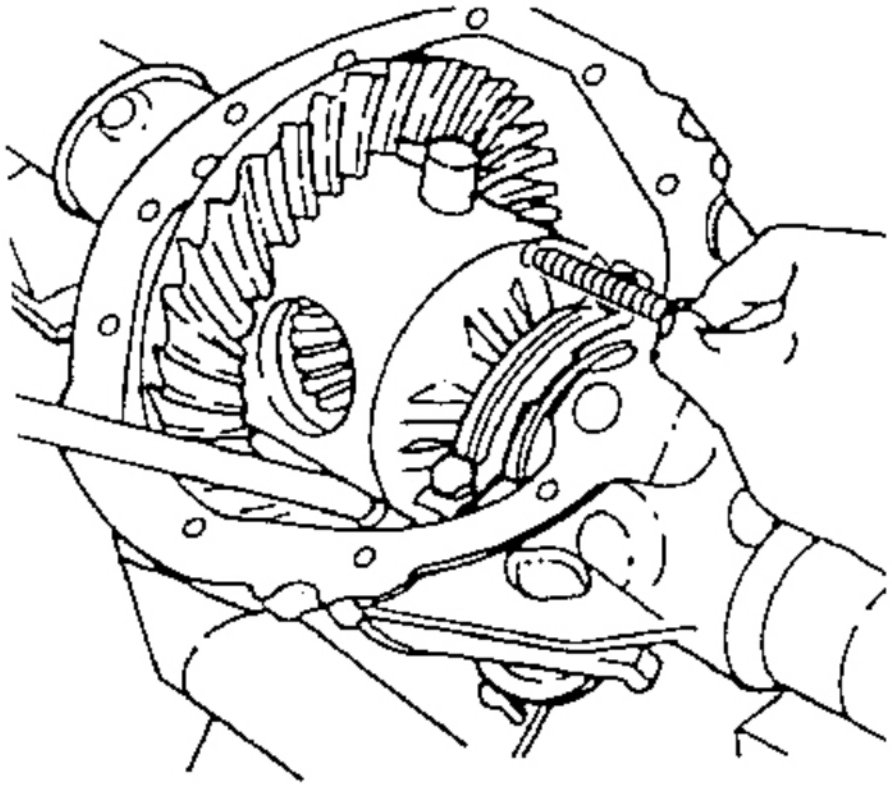
Tools Required

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

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Remove the brake caliper. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
4. Remove the rear wheel speed sensor. Refer to **Wheel Speed Sensor Replacement - Rear** in Antilock Brake System.
5. Remove the rear cover and the gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
6. Remove the pinion shaft locking bolt.



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

7. Remove the pinion shaft.

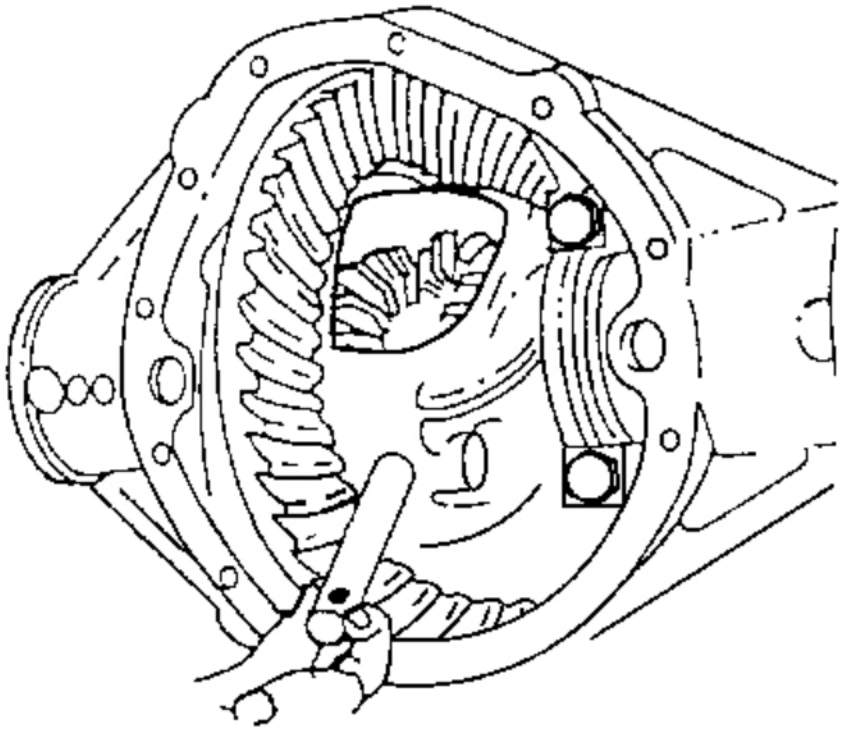


Fig. 62: View Of Pinion Shaft
Courtesy of GENERAL MOTORS CORP.

8. Push the flange of the axle shaft (1) toward the differential.

IMPORTANT: It may be necessary to tap the axle shaft toward the differential with a soft faced mallet to obtain the clearance needed to remove the C-lock.

9. 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.

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10. Remove the axle shaft (1) from the housing (5) by pulling the axle shaft away from the differential.

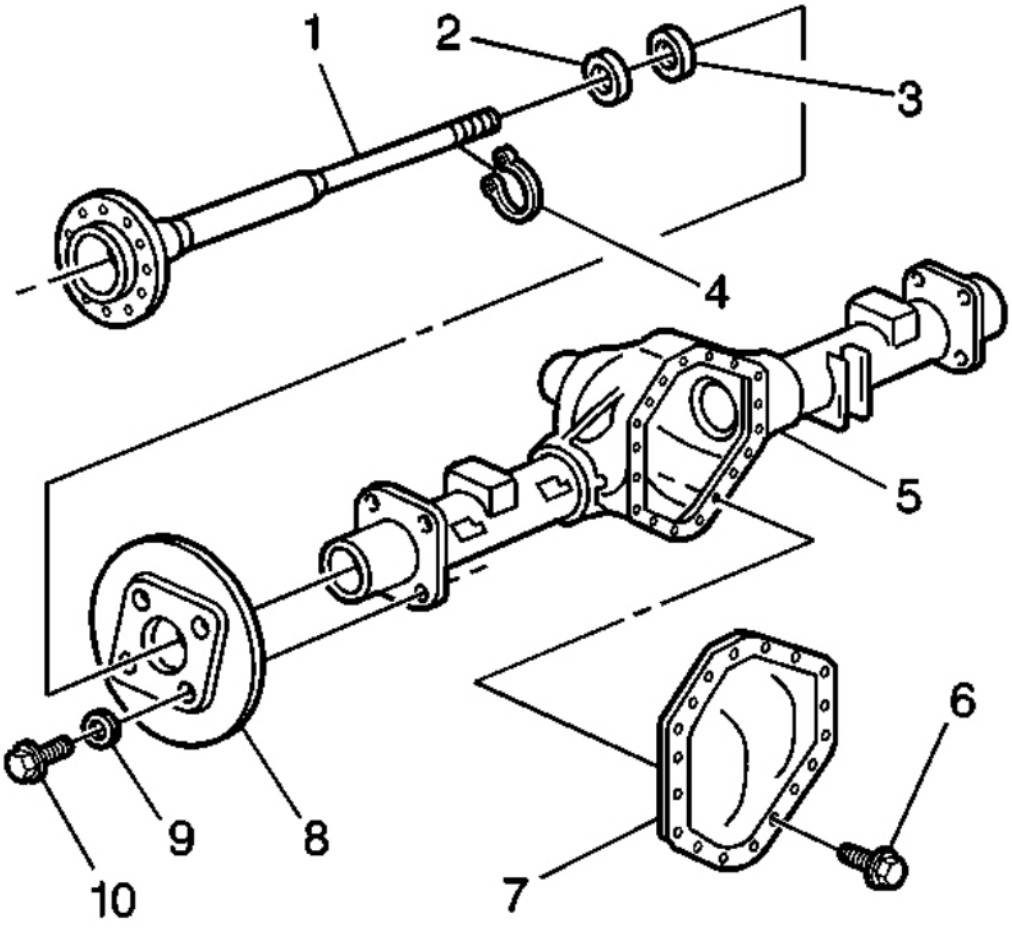


Fig. 63: Axle Shaft Housing & Components
Courtesy of GENERAL MOTORS CORP.

11. If the axle is difficult to remove, use the **J 45859** (1) and the **J 2619-01** (2) to remove the axle shaft from the housing.

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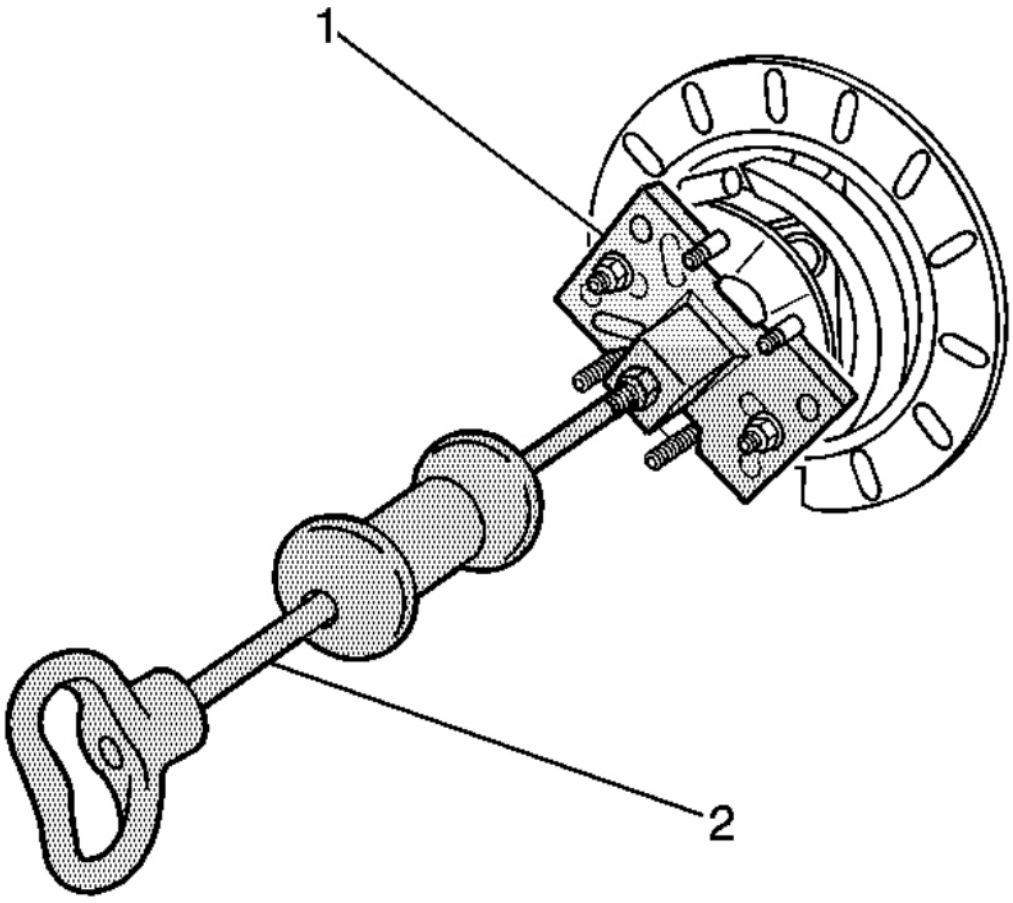


Fig. 64: Removing Axle Shaft Using J 45859 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

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.

   It may be necessary to tap the end of the axle shaft with a soft faced mallet as it is being installed to seat the wheel speed sensor ring on the axle.

3. Place the lock (4) on the button end of the axle shaft (1).

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4. Pull the shaft flange outward in order to seat the lock in the differential gear.

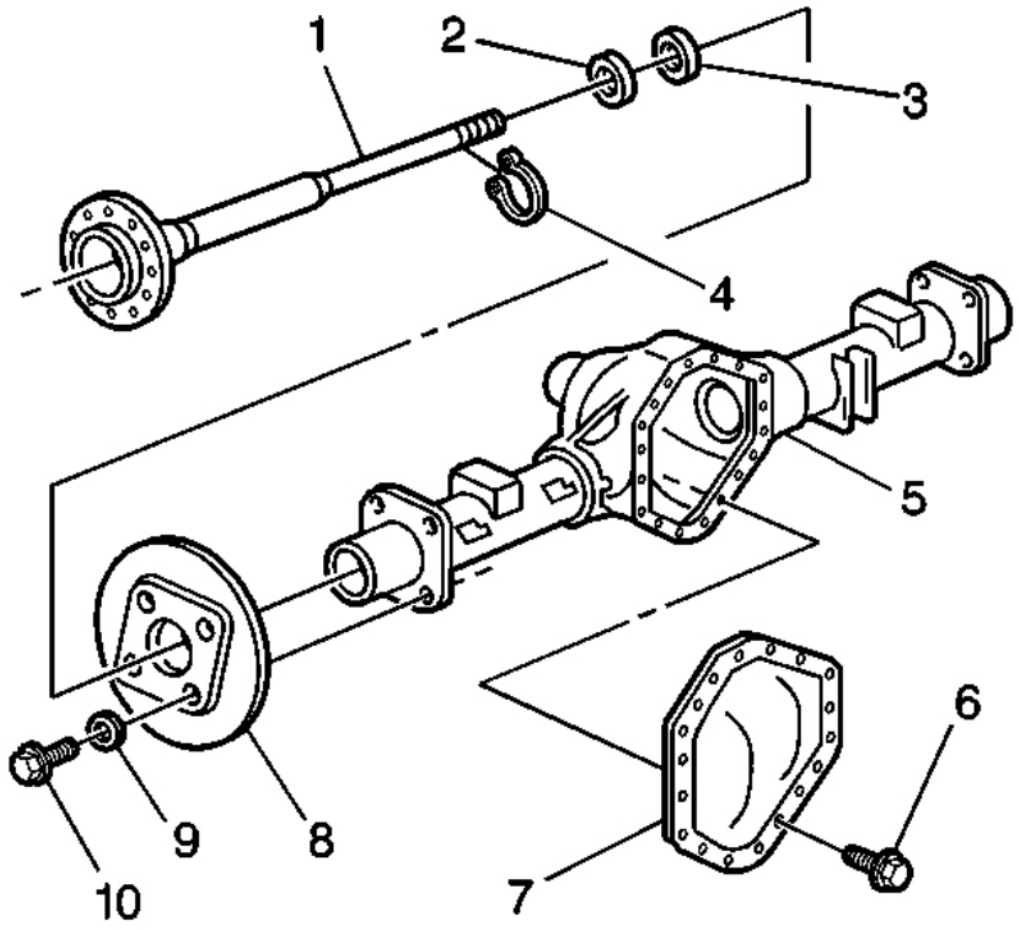


Fig. 65: Axle Shaft Housing & Components
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice in Cautions and Notices.

6. Install the new pinion shaft locking bolt.

Tighten: Tighten the pinion shaft locking bolt to 36 N.m (27 lb ft).

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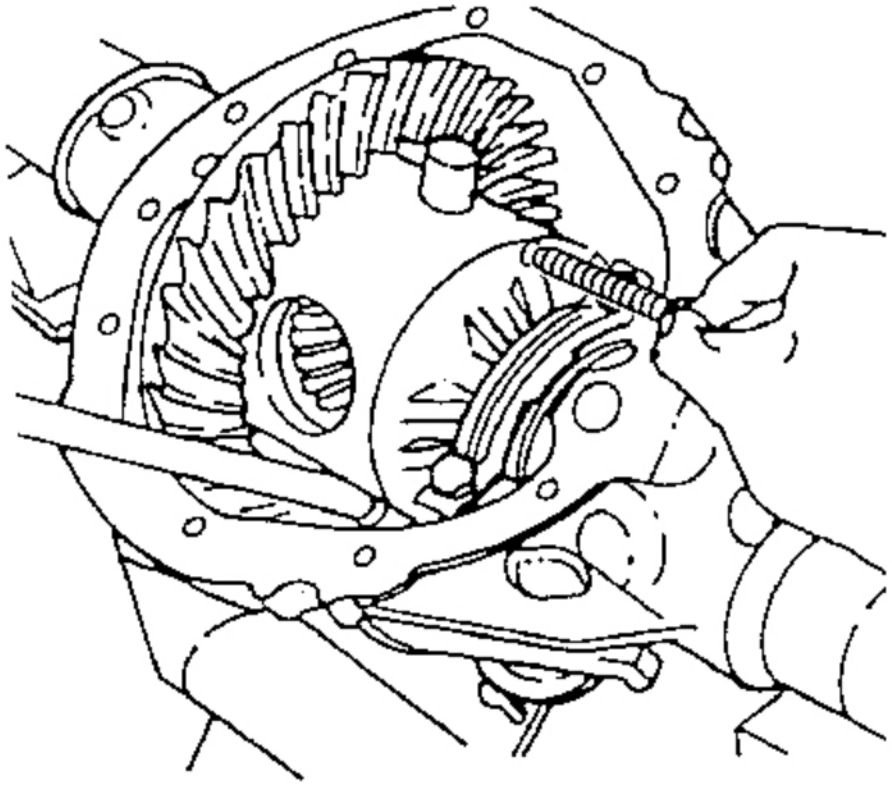


Fig. 66: View Of Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS CORP.

7. Install the rear cover and the gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
8. Install the rear wheel speed sensor. Refer to **Wheel Speed Sensor Replacement - Rear** in Antilock Brake System.
9. Install the brake caliper. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
10. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
11. Fill the rear axle. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
12. Lower the vehicle.

REAR AXLE SHAFT REPLACEMENT (9.75 INCH AXLE)

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Removal Procedure

1. Release the park brake.
2. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
3. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
4. Remove the rear steering gear assembly. Refer to **Steering Gear Actuator and Cover Replacement** in Rear Wheel Steering.
5. Remove the steering knuckle assembly. Refer to **Steering Knuckle Replacement** in Rear Wheel Steering.
6. Remove the lock clip from the axle shaft end. The lock clip is spring loaded and fits securely in the axle shaft slot and may need to be push off the shaft end with a screw driver or related tool. Pushing the axle shaft inwards towards the gears my help in removal of the lock clip.

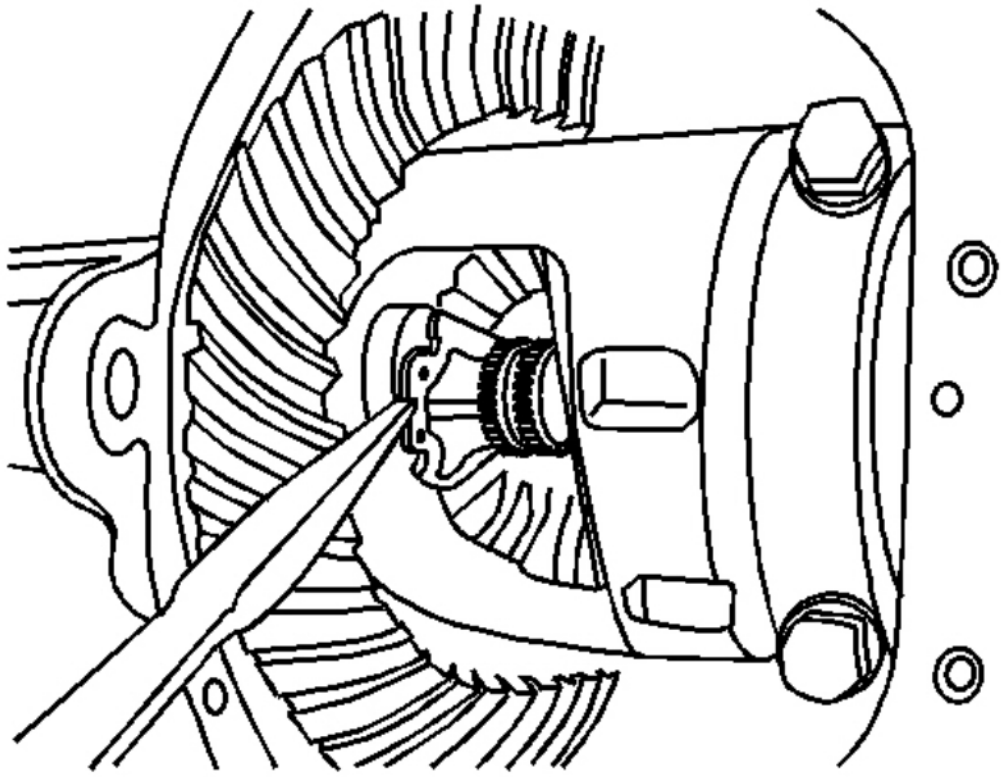


Fig. 67: View Of Spring Loaded Lock Clip At Axle Shaft End
Courtesy of GENERAL MOTORS CORP.

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IMPORTANT: When removing the axle shaft do not rotate the shaft. Rotating the shaft will cause the gears to move. Misalignment of the gears will make the assembly difficult.

7. Remove the axle shaft.

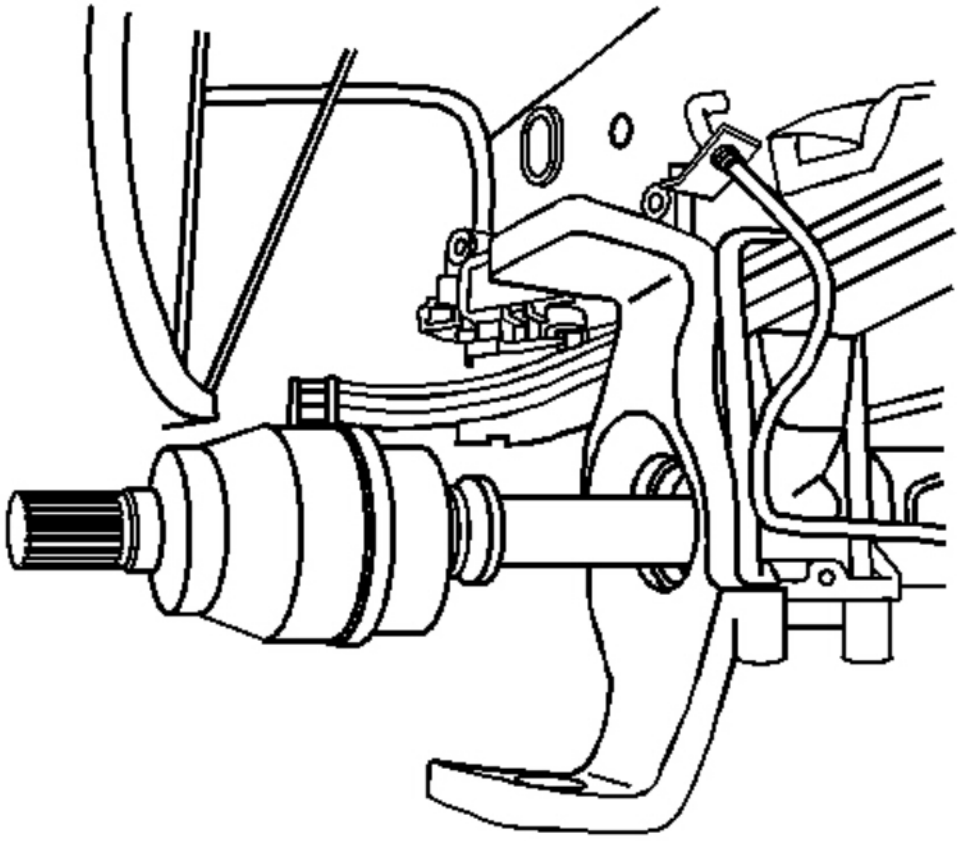


Fig. 68: View Of Rear Axle Shaft (9.75 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the axle shaft.

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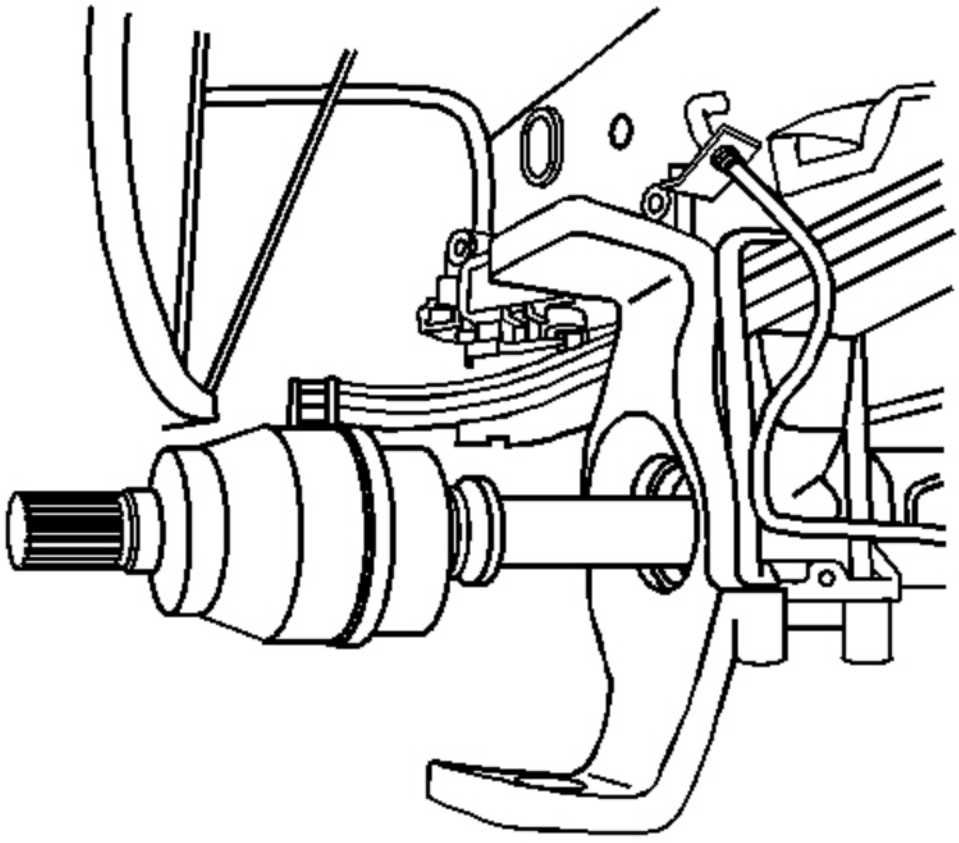


Fig. 69: View Of Rear Axle Shaft (9.75 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

2. Install the spring loaded lock clip to the axle shaft end.

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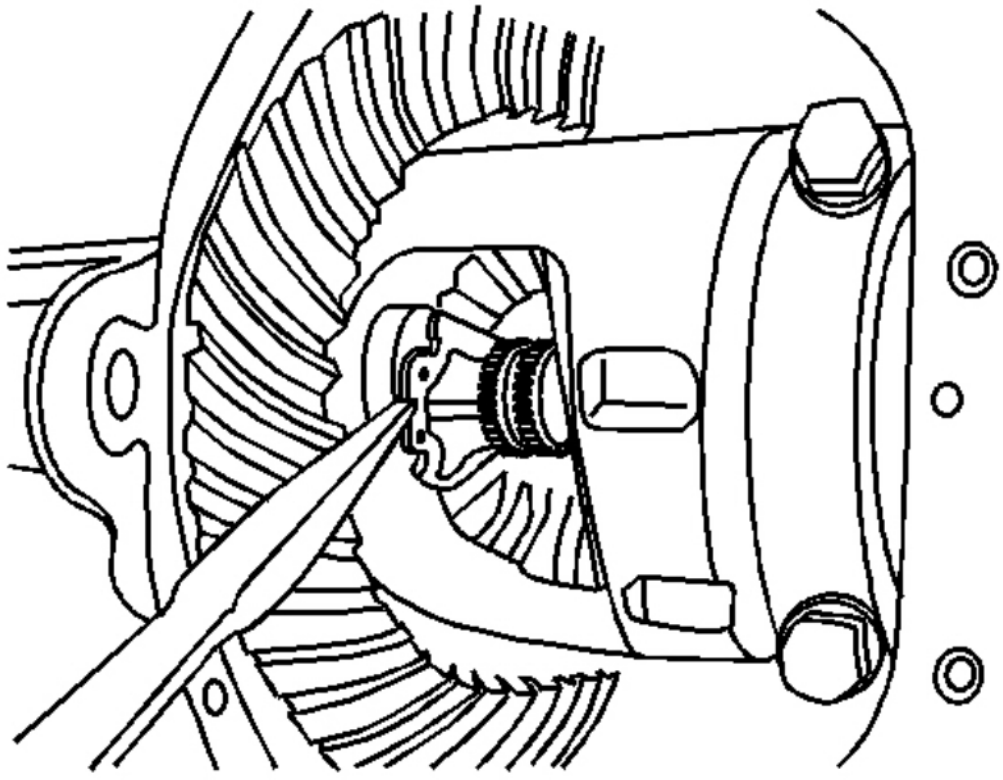


Fig. 70: View Of Spring Loaded Lock Clip At Axle Shaft End
Courtesy of GENERAL MOTORS CORP.

3. Install the steering knuckle assembly. Refer to **Steering Knuckle Replacement** in Rear Wheel Steering.
4. Install the rear steering gear assembly. Refer to **Steering Gear Actuator and Cover Replacement** in Rear Wheel Steering.
5. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
6. Lower the vehicle.

REAR AXLE SHAFT SEAL REPLACEMENT - OUTER

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

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3. Remove the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
4. Remove the axle shaft seal.

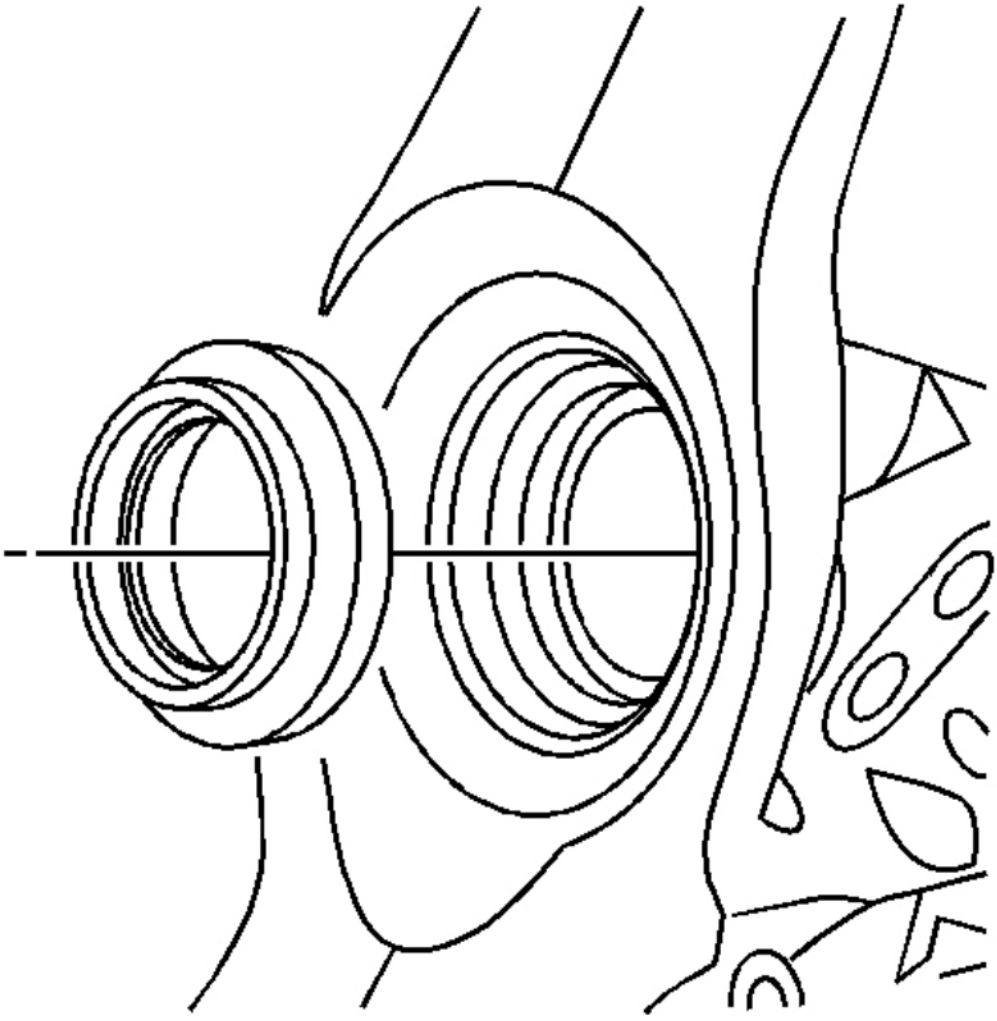


Fig. 71: View Of Rear Axle Shaft Seal - Outer
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

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1. Install the axle shaft seal.

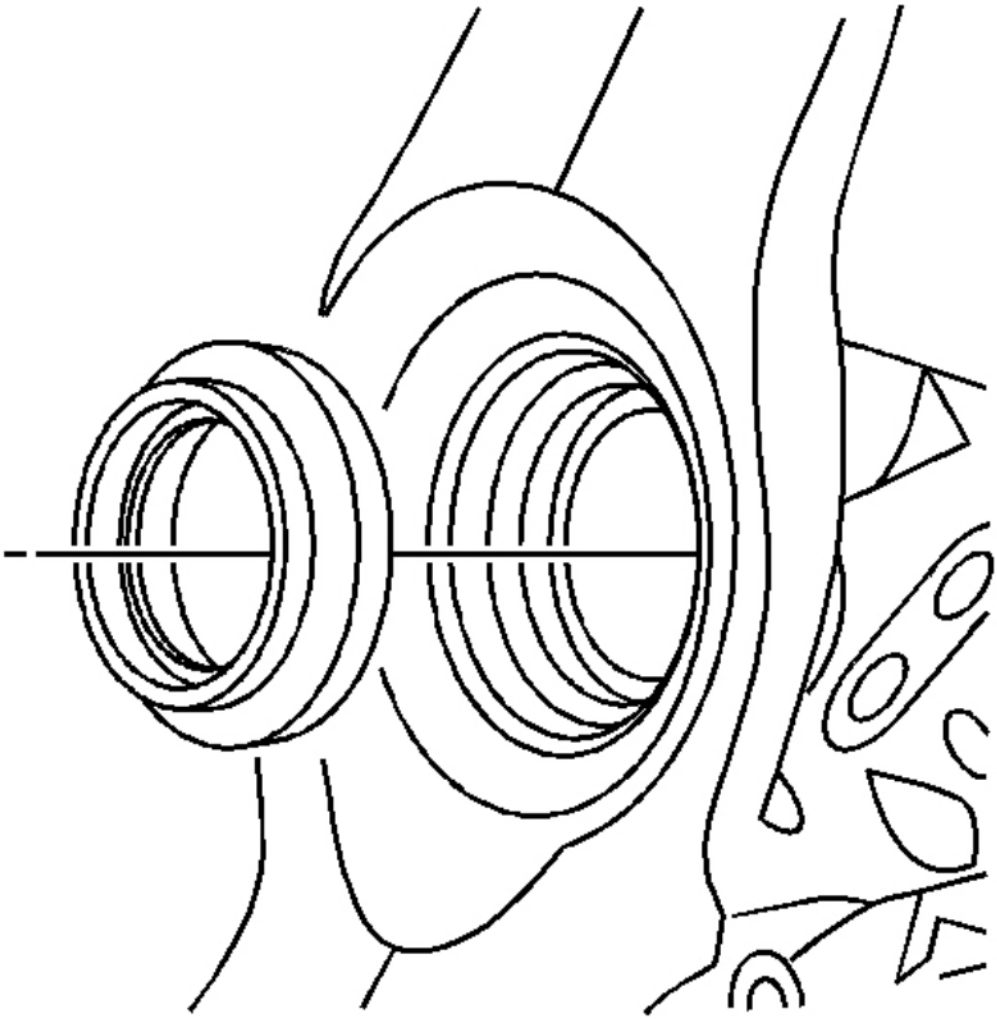


Fig. 72: View Of Rear Axle Shaft Seal - Outer
Courtesy of GENERAL MOTORS CORP.

2. Install the axle shaft. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
3. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

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4. Lower the vehicle.

REAR AXLE SHAFT SEAL REPLACEMENT - INNER

Tools Required

- **J 33049** Camshaft Bearing Service Set. See **Special Tools and Equipment**.
- **J 45177** Differential Seal Installer - Inner

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
4. Remove the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
5. Install the smallest expanding driver (3) and the small driving washer (1) onto the expander assembly (2).

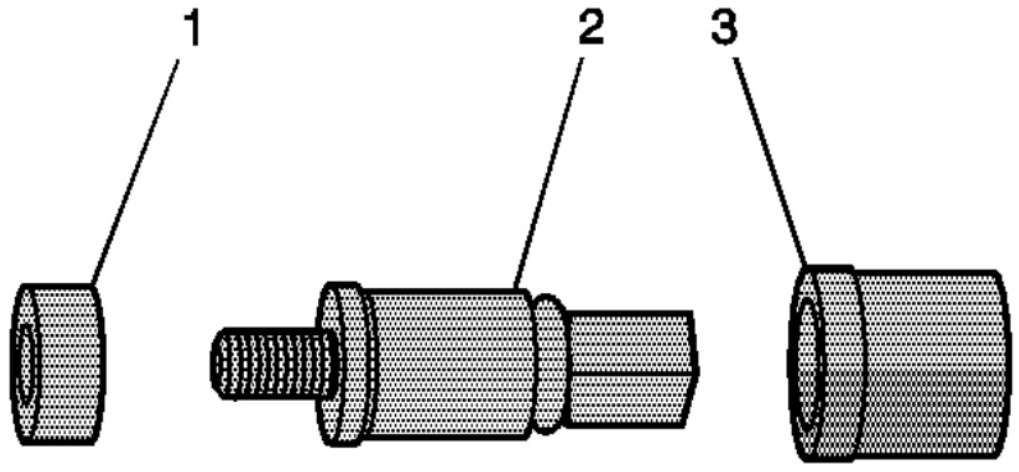


Fig. 73: View Of Expanding Driver, Driving Washer & Expander Assembly
Courtesy of GENERAL MOTORS CORP.

6. Align the separation lines between the expanding driver and the expander assembly.

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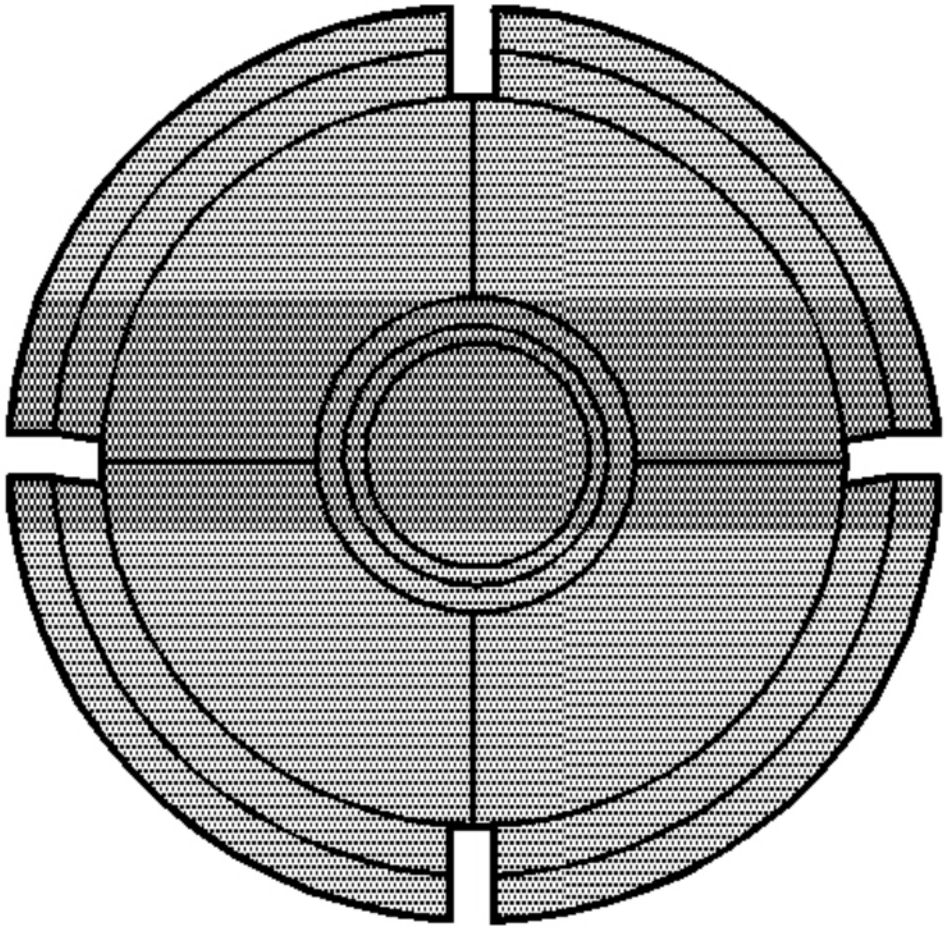


Fig. 74: View Of Separation Lines Between Expanding Driver & Expander Assembly
Courtesy of GENERAL MOTORS CORP.

7. Assemble the expander assembly (2) onto the driver bar extension (1).

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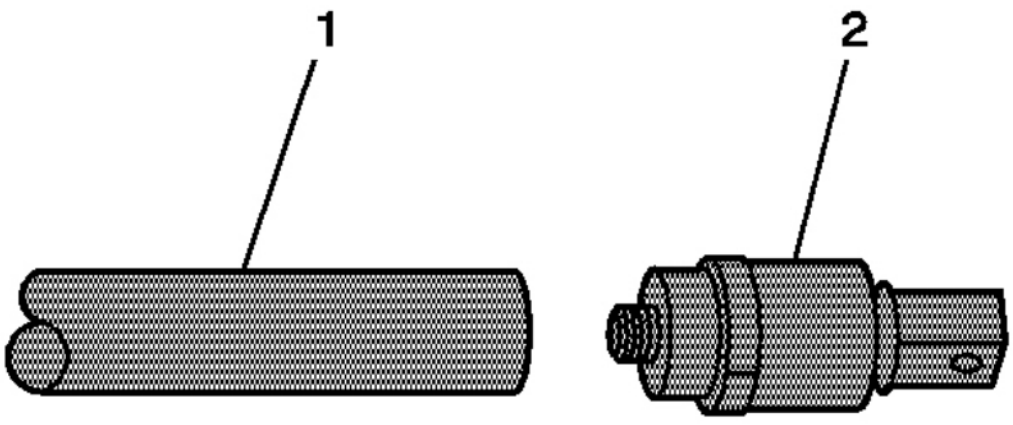


Fig. 75: View Of Expander Assembly & Driver Bar Extension
Courtesy of GENERAL MOTORS CORP.

8. Assemble the drive bar extension onto the driver bar.
9. Insert the **J 33049** into the axle tube and through the axle shaft seal. See **Special Tools and Equipment**.

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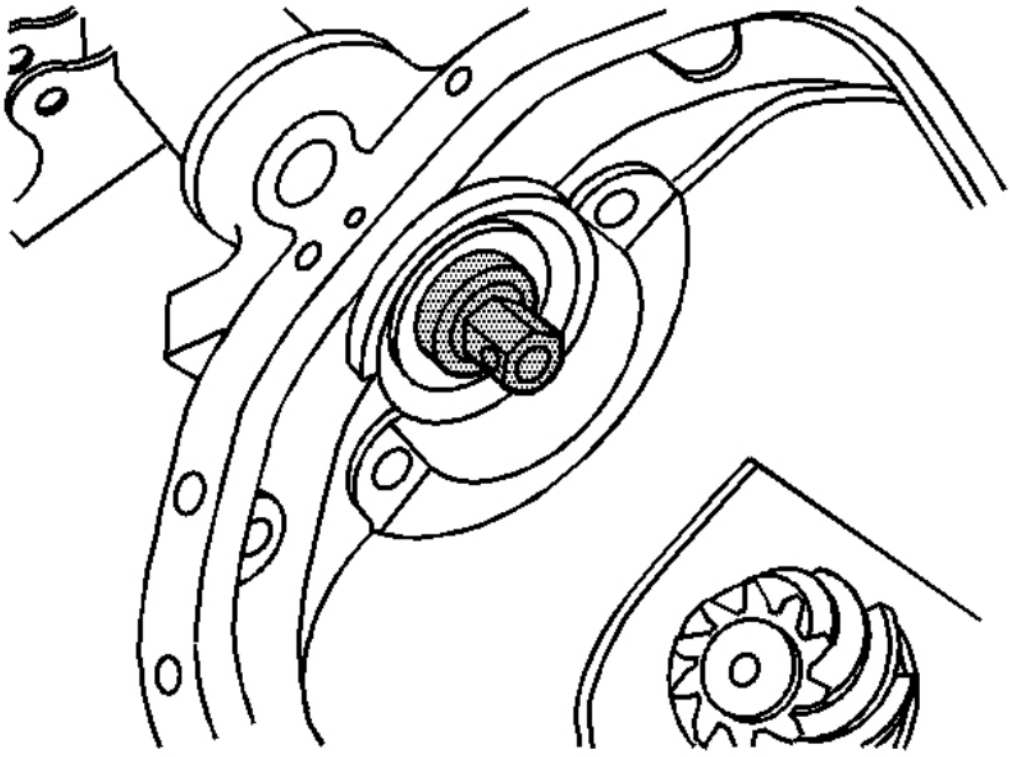


Fig. 76: Installing J 33049 Into Axle Tube
Courtesy of GENERAL MOTORS CORP.

10. While holding the expander assembly nut, turn the driving bar clockwise until the expanding driver is snug against the axle shaft seal.
11. Drive out the seal using the **J 33049** and a hammer. See **Special Tools and Equipment**.

Installation Procedure

1. Assemble the drive bar extension onto the drive bar of **J 33049** . See **Special Tools and Equipment**.
2. Insert the **J 33049** into the opposite side axle shaft tube. See **Special Tools and Equipment**.
3. Install the **J 45177** onto the **J 33049** . See **Special Tools and Equipment**.
4. Insert the axle shaft seal into the axle tube.

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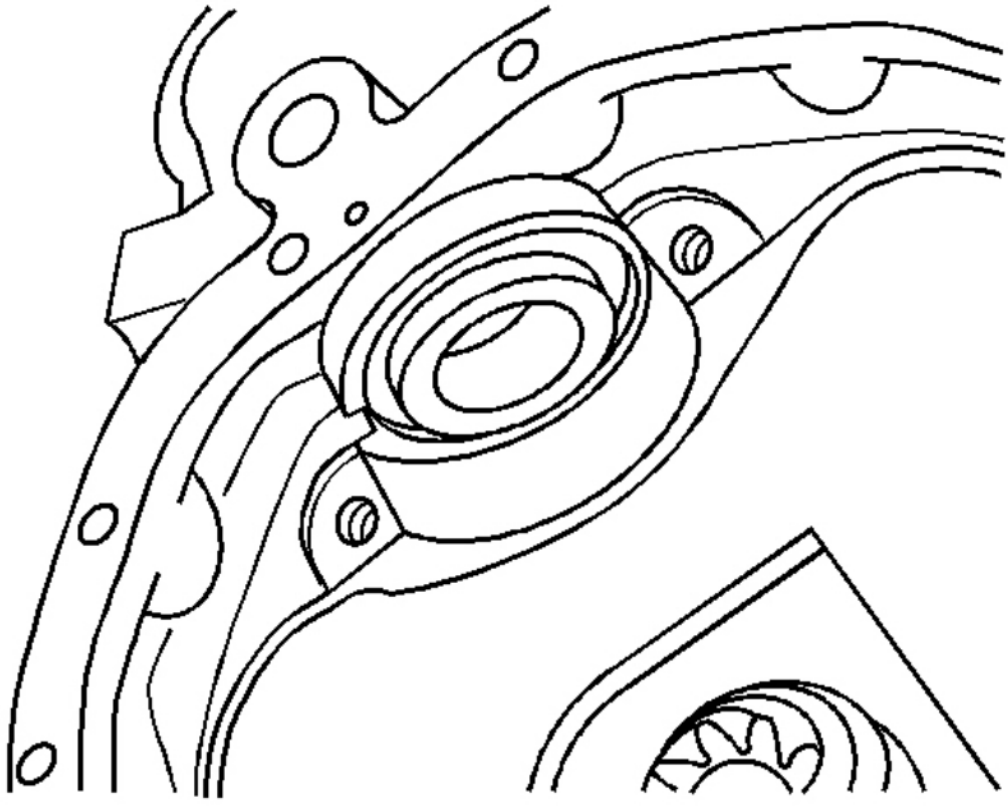


Fig. 77: View Of Axle Shaft Seal In Axle Tube
Courtesy of GENERAL MOTORS CORP.

5. Install the **J 45177** (1) and the **J 33049** (2) over the axle shaft seal. See **Special Tools and Equipment**.

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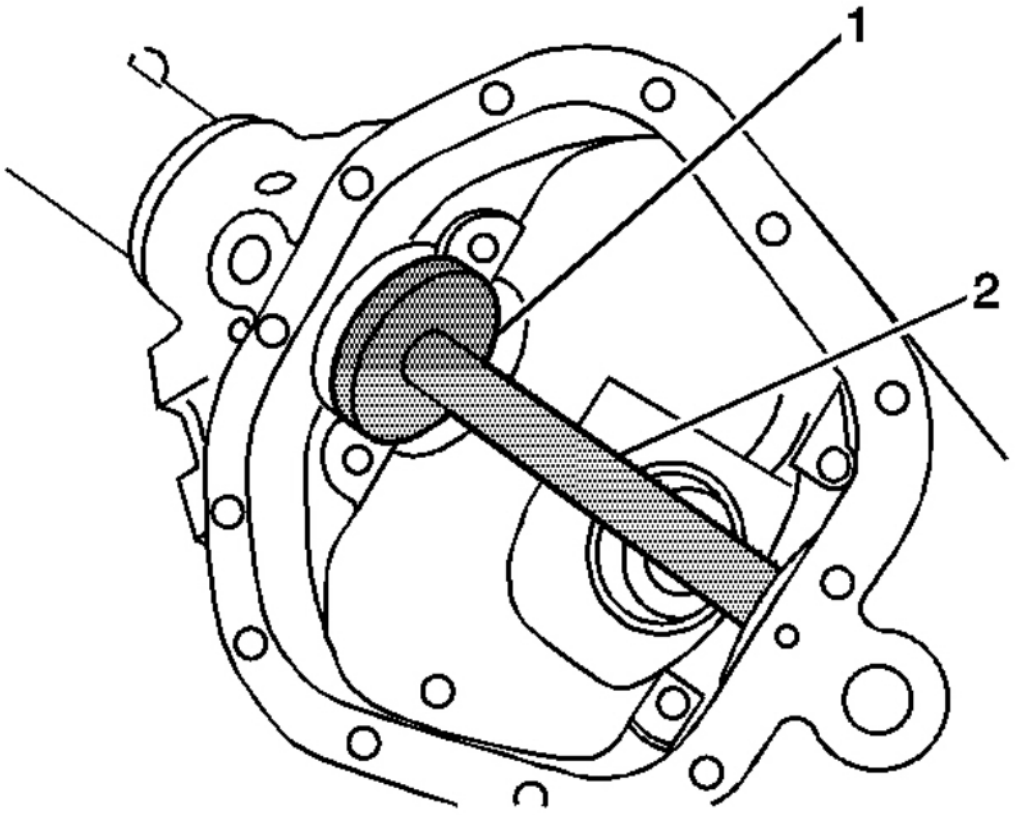


Fig. 78: View Of J 45177 & J 33049 Over Axle Shaft Seal
Courtesy of GENERAL MOTORS CORP.

6. Drive the axle shaft seal into the axle tube using the **J 45177** , the **J 33049** and a hammer. See **Special Tools and Equipment**.
7. Install the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
8. Install the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
10. Lower the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

REAR AXLE SHAFT SEAL AND/OR BEARING REPLACEMENT (8.6 INCH AXLE W/O JL4, 9.5 INCH AXLE)

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Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10. See **Special Tools and Equipment**.
- **J 21128** Axle Pinion Oil Seal Installer (8.6 inch Axle)
- **J 23690** Bearing Installer (8.6 inch Axle)
- **J 2619-01** Slide Hammer
- **J 29709** Wheel Bearing Installer (9.5 inch Axle).
- **J 29712** Wheel Bearing Remover (9.5 inch Axle)
- **J 29713** Axle Seal Installer (9.5 inch Axle)
- **J 44685** Rear Axle Seal and Bearing Remover (8.6 inch Axle)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
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/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
5. Remove the axle shaft seal and the bearing from the axle housing using the **J 44685** (8.6 inch axle) (1) and the **J 2619-01** (2).

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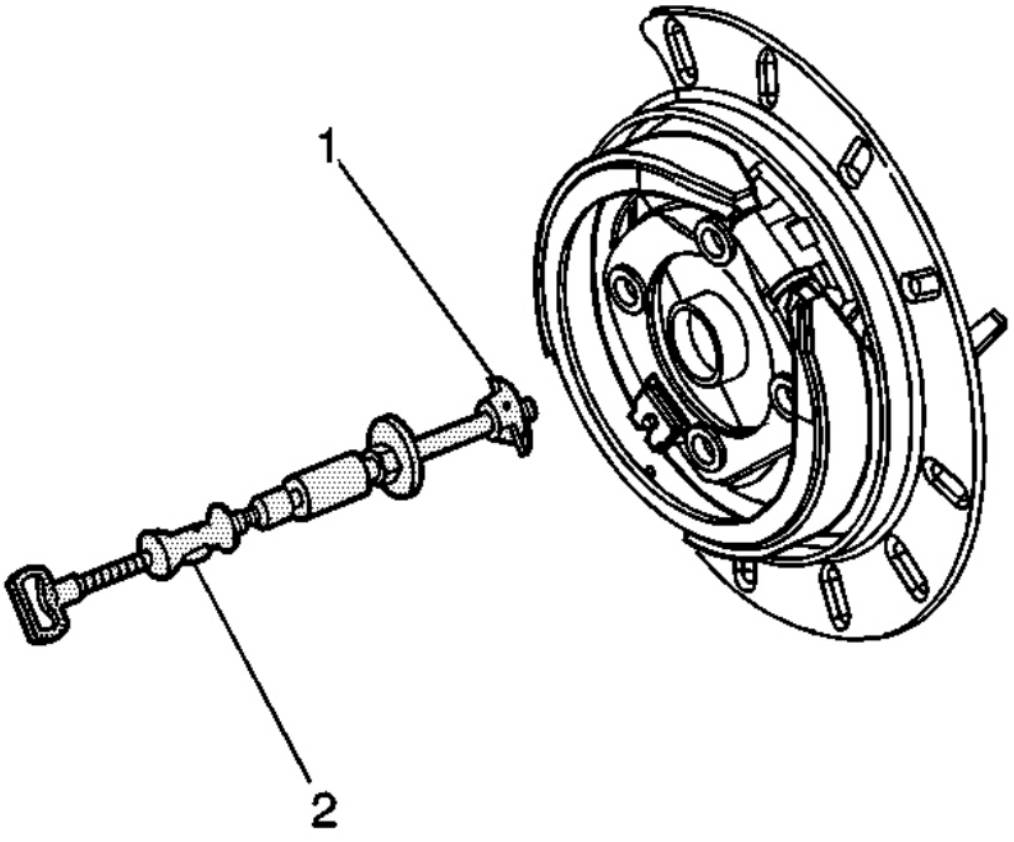


Fig. 79: Removing Axle Shaft Seal & Bearing Using J 44685 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

6. Remove the axle shaft seal and the bearing from the axle housing using the **J 29712** (9.5 inch axle). See **Special Tools and Equipment**.

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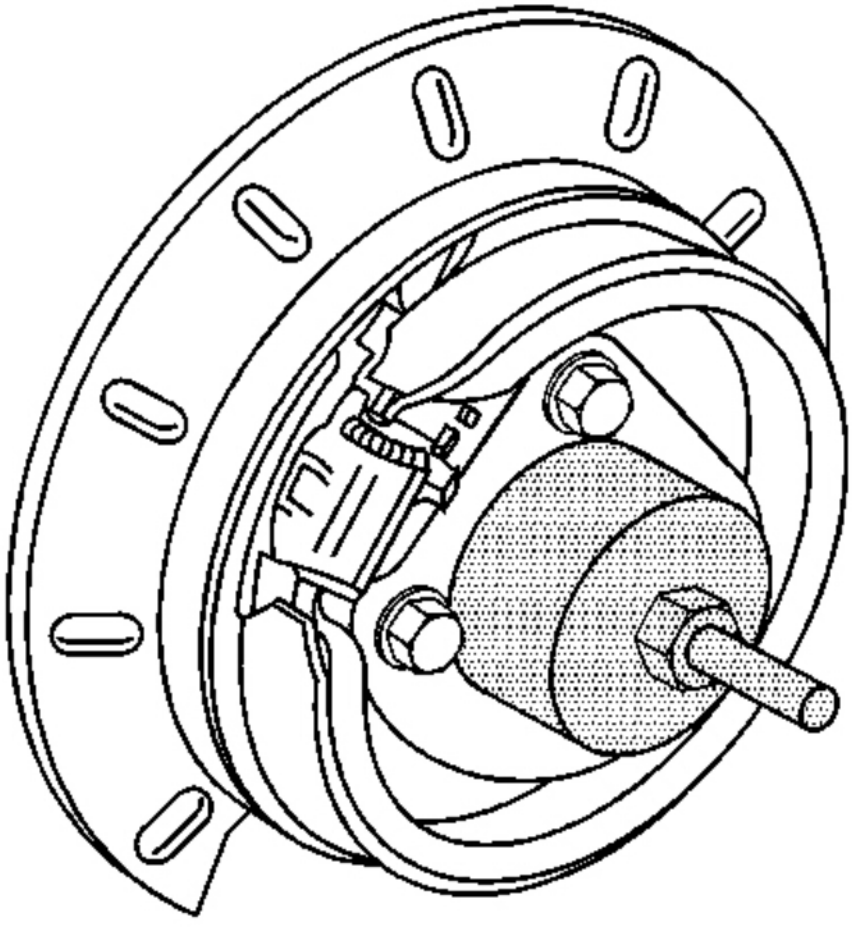


Fig. 80: Removing Axle Shaft Seal & Bearing Using J 29712
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the axle shaft bearing using the **J 23690** (8.6 inch axle) (1) or the **J 29709** (9.5 inch axle) (1) and the **J 8092** (2). See **Special Tools and Equipment**.

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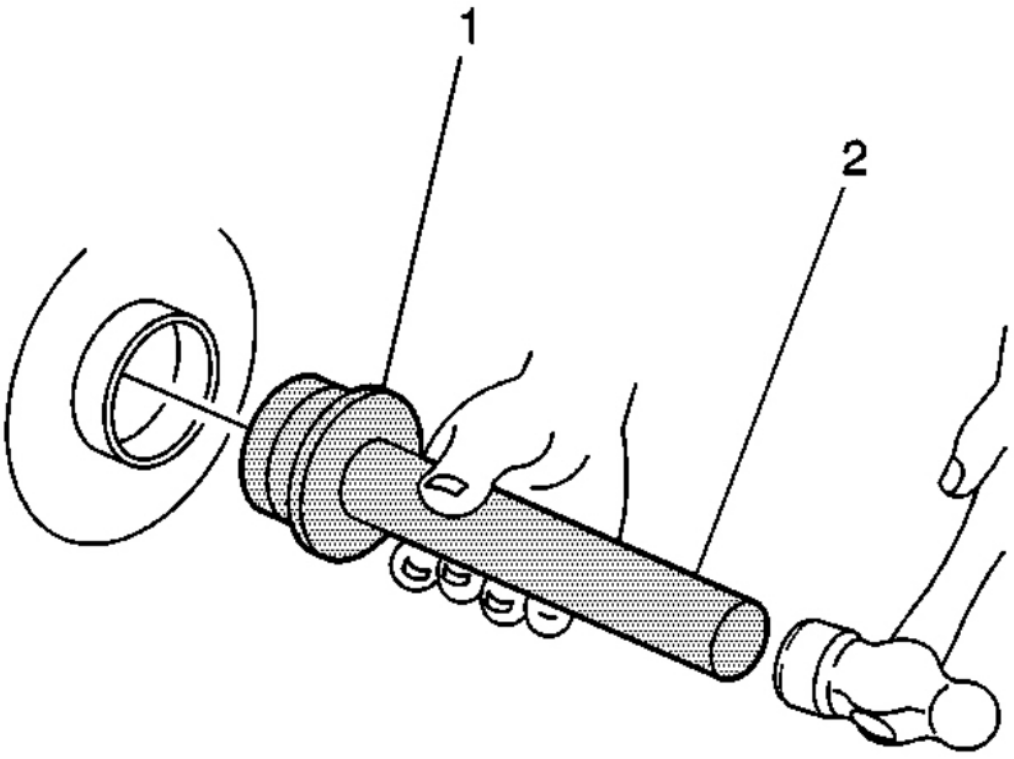


Fig. 81: Installing Axle Shaft Bearing Using J 23690 & J 8092
Courtesy of GENERAL MOTORS CORP.

2. Drive the axle shaft bearing into the axle housing until the tool bottoms against the tube.
3. Install the axle shaft seal using the **J 21128** (8.6 inch axle) or the **J 29713** (9.5 inch axle). See **Special Tools and Equipment**.

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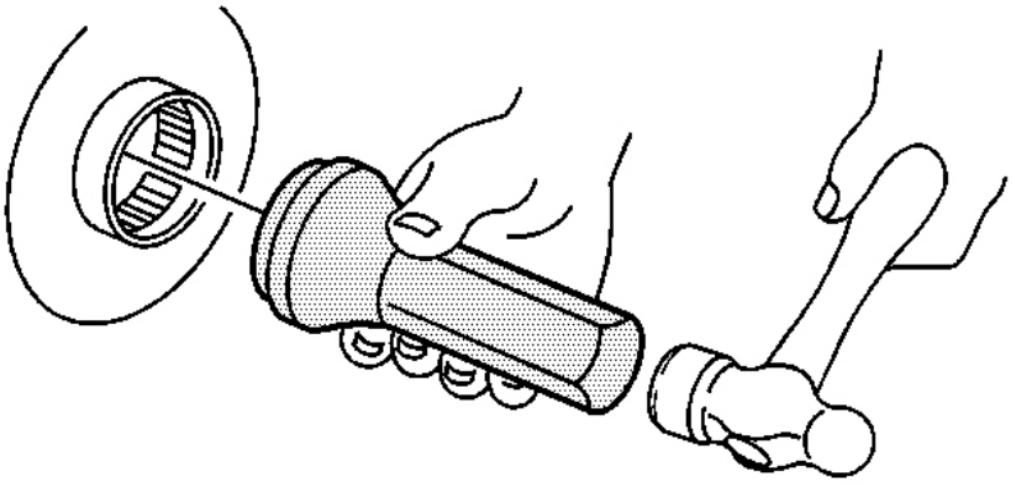


Fig. 82: Driving J 21128 Or J 29713 Into The Bore Until The Axle Shaft Seal Bottoms Flush With The Tube
Courtesy of GENERAL MOTORS CORP.

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/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
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** in Tires and Wheels.
8. Fill the rear axle. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
9. Lower the vehicle.

REAR AXLE SHAFT SEAL AND/OR BEARING REPLACEMENT (8.6 INCH AXLE W/JL4)

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

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- **J 45857** Tone Wheel and/or Bearing Remover

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
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/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
5. To remove the seal only, use a suitable seal remover.
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).

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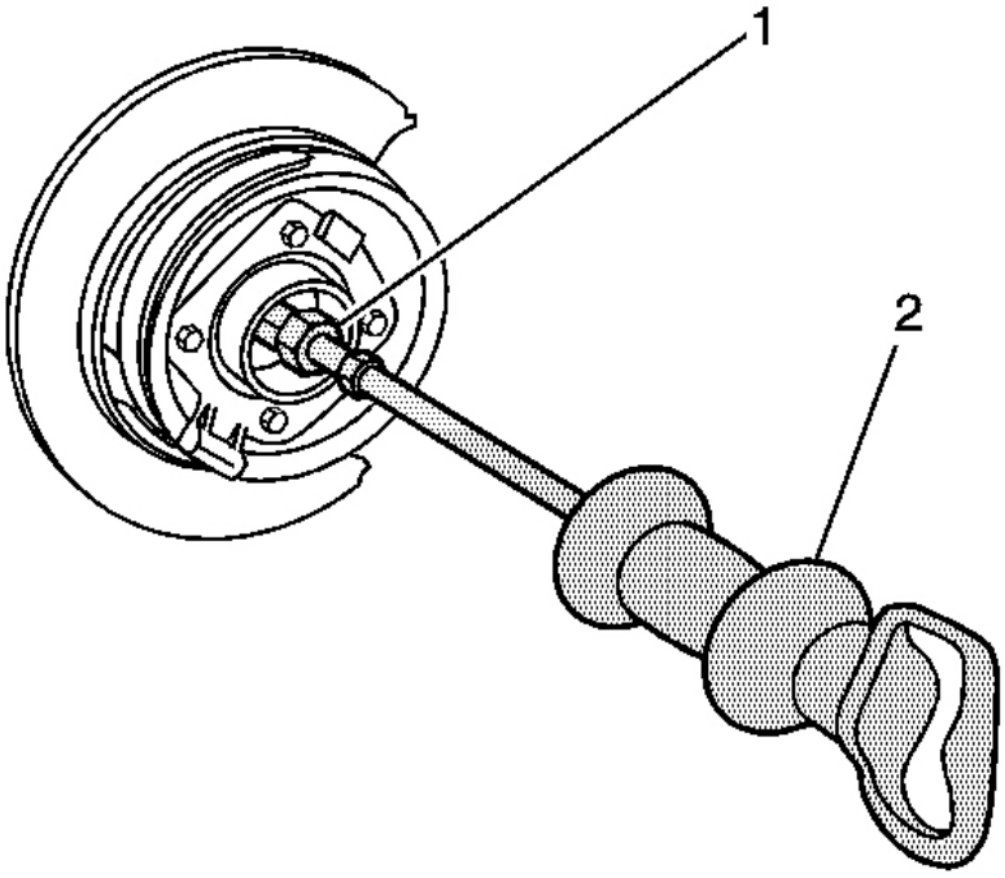


Fig. 83: Removing Axle Shaft Seal & Bearing Using J 45857 & J 2619-01
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the axle shaft bearing using the **J 23690** (1) and the **J 8092** (2).

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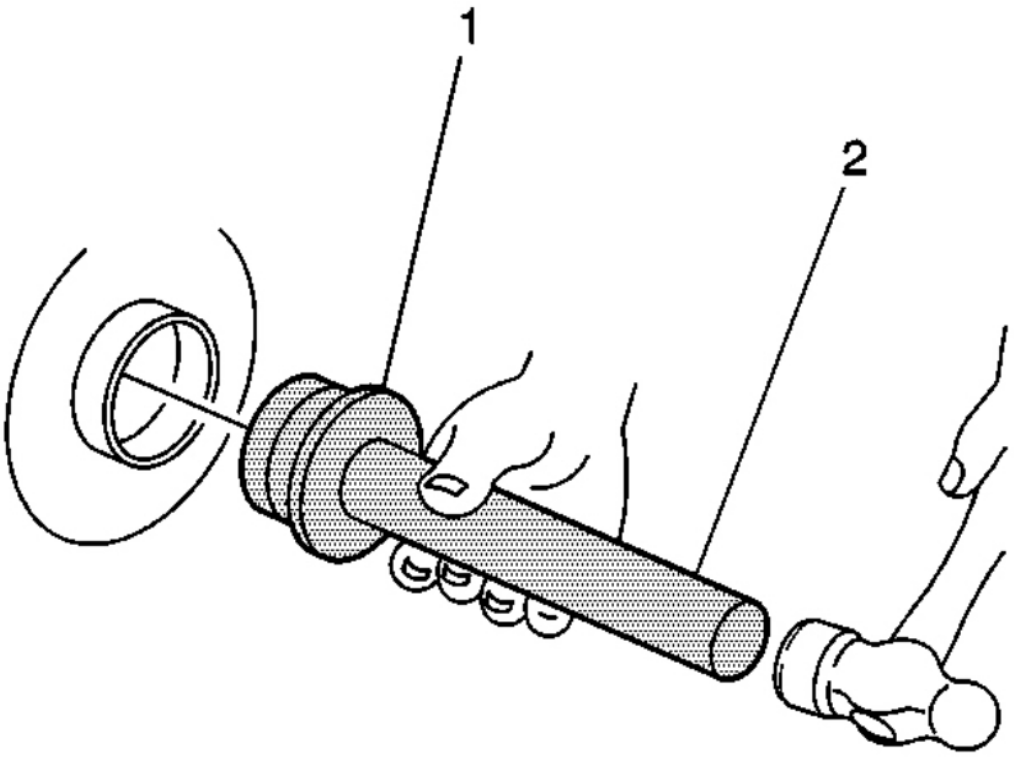


Fig. 84: Installing Axle Shaft Bearing Using J 23690 & J 8092
Courtesy of GENERAL MOTORS CORP.

2. Drive the axle shaft bearing into the axle housing until the tool bottoms against the tube.
3. Install the axle shaft seal using the **J 21128** .

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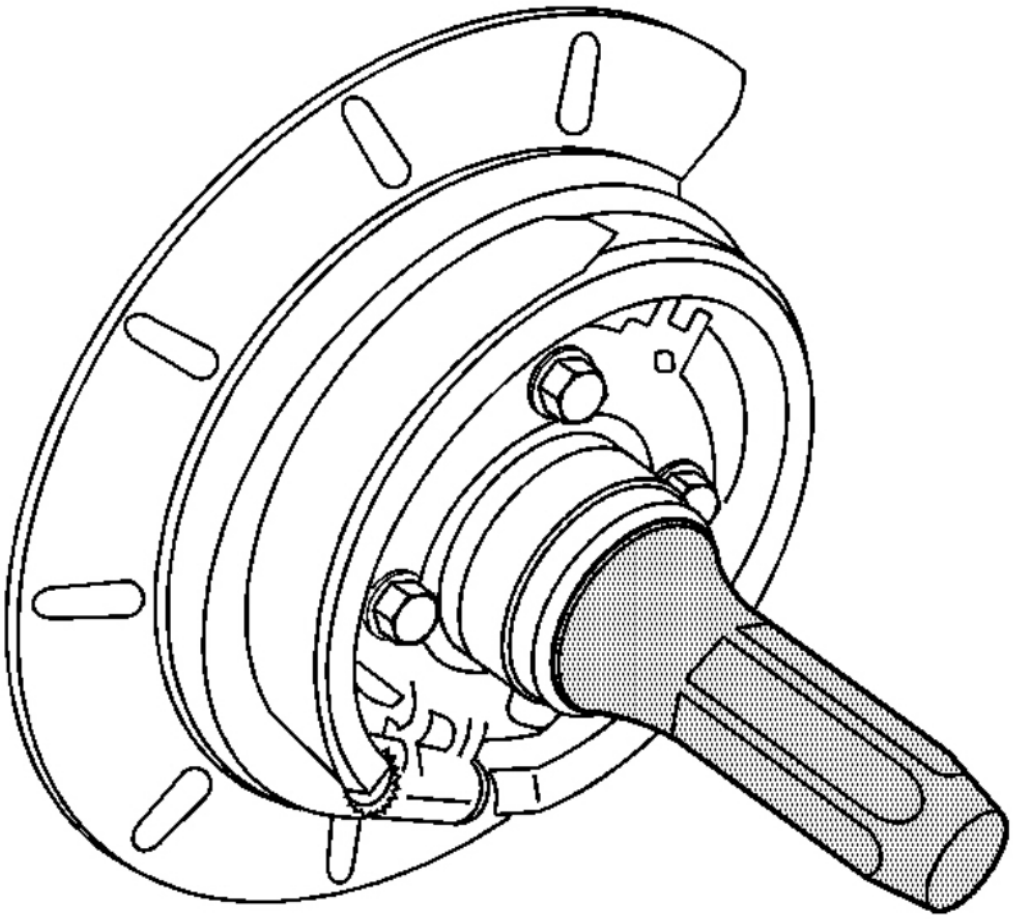


Fig. 85: Installing Axle Shaft Seal Using J 21128
Courtesy of GENERAL MOTORS CORP.

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/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
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** in Tires and Wheels.
8. Fill the rear axle. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.

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9. Lower the vehicle.

REAR AXLE SHAFT AND/OR GASKET REPLACEMENT

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Remove the flange bolts.
4. Lightly tap the axle shaft with a soft-faced hammer in order to loosen the shaft.
5. 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.
6. Remove the axle shaft from the tube.
7. Remove the gasket.
8. Clean the axle shaft flange and the outside face of the hub assembly.

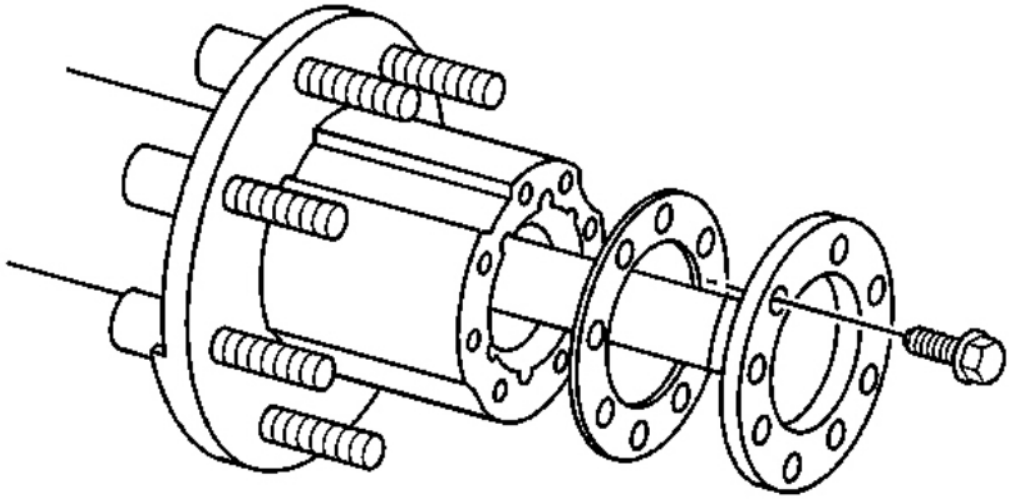


Fig. 86: View Of Rear Axle Shaft, Flange, Flange Bolts & Gasket
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the gasket onto the axle shaft.
2. Install the gasket and the axle shaft into the axle tube.

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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 in Cautions and Notices.

3. Install the axle flange bolts.

   Tighten: Tighten the rear axle flange bolts to 156 N.m (115 lb ft).

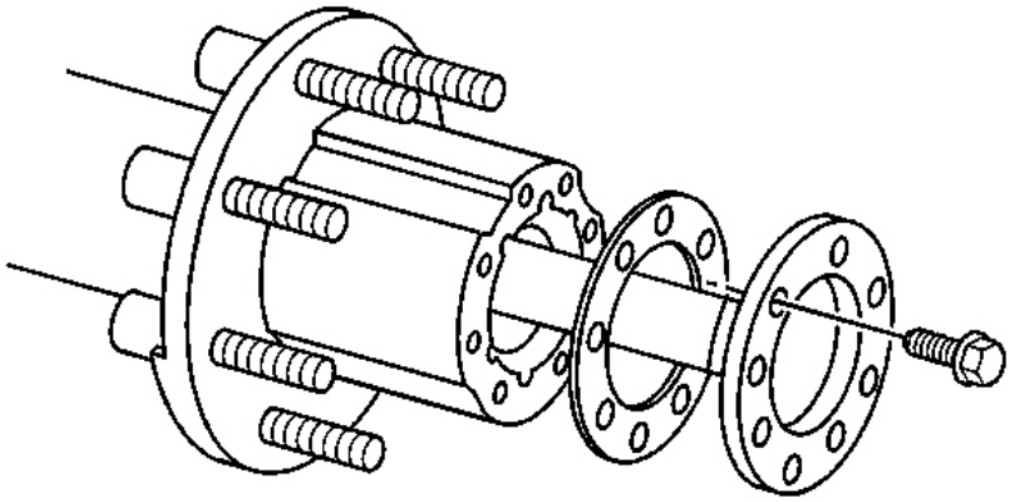


Fig. 87: View Of Rear Axle Shaft, Flange, Flange Bolts & Gasket
Courtesy of GENERAL MOTORS CORP.

4. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
5. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Lubricant Level Inspection - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.75 Inch Axle)**.
6. Lower the vehicle.

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

Tools Required

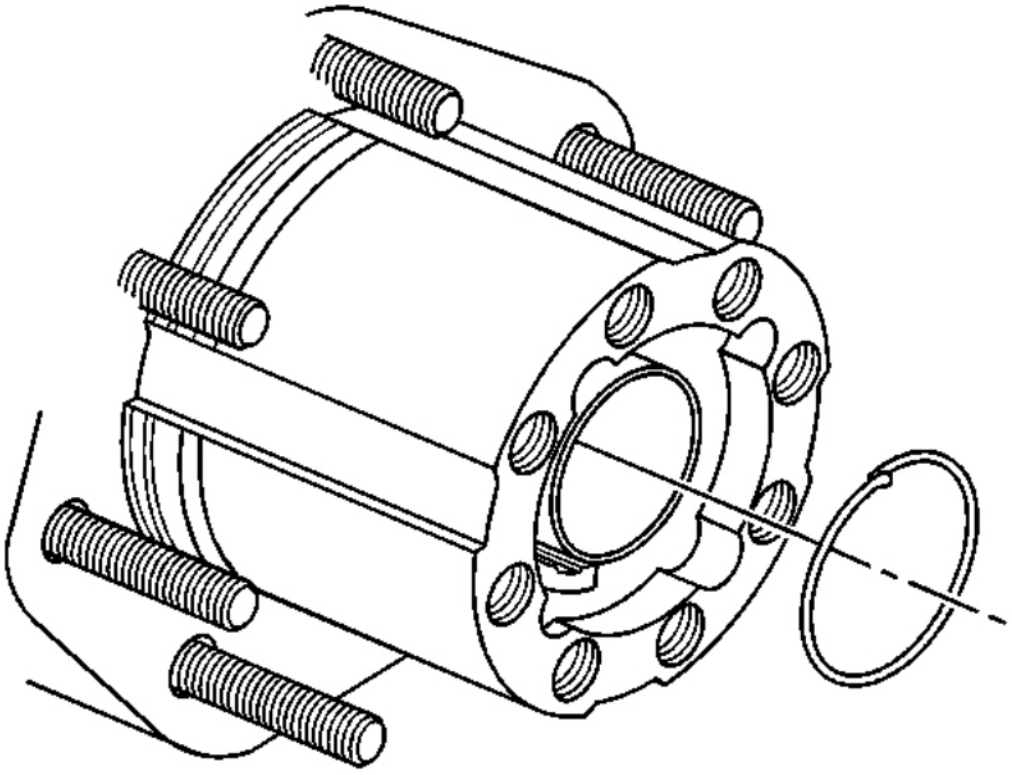
- **J 8092** Universal Driver Handle - 3/4 inch - 10. See **Special Tools and Equipment**.

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- J 2222-C Wheel Bearing Nut Wrench
- **J 24426** Wheel Bearing Race Installer - Outer
- **J 24427** Wheel Bearing Race Installer - Inner
- **J 44419** Hub Outer Bearing Race Installer
- **J 44420** Differential Bearing and Hub Seal Installer

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Remove the brake caliper. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
4. Remove the axle shaft. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
5. Remove the axle nut retaining ring.



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

6. Remove the key.

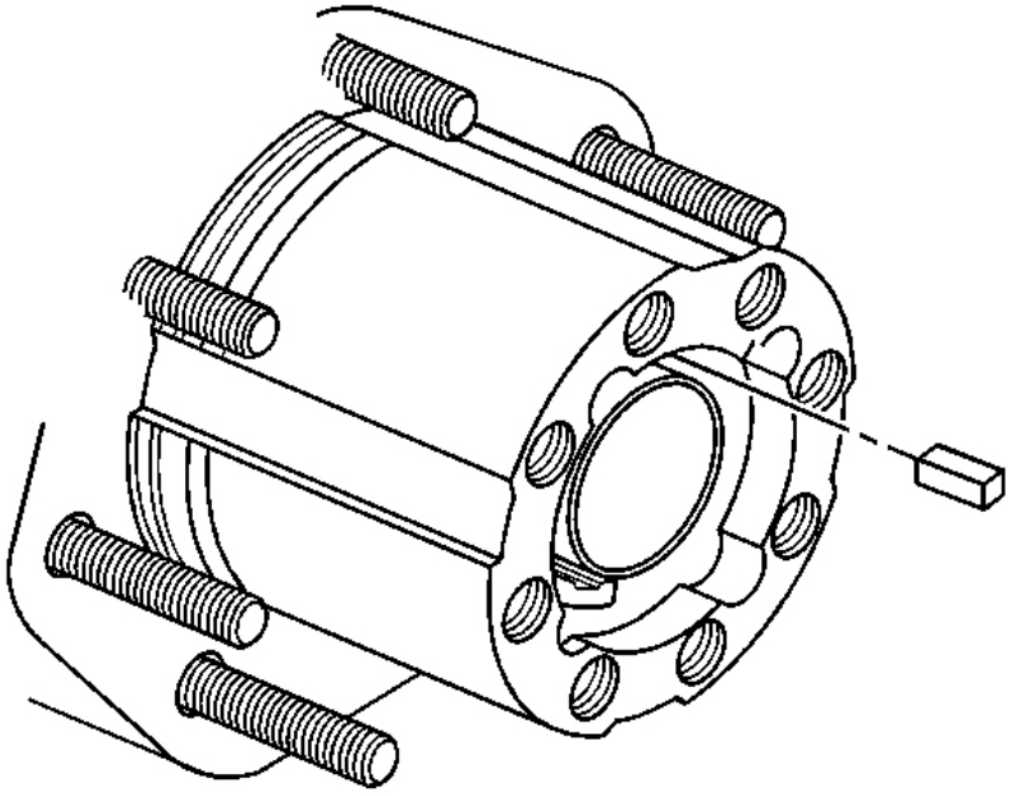


Fig. 89: Adjuster Nut Lock Key
Courtesy of GENERAL MOTORS CORP.

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

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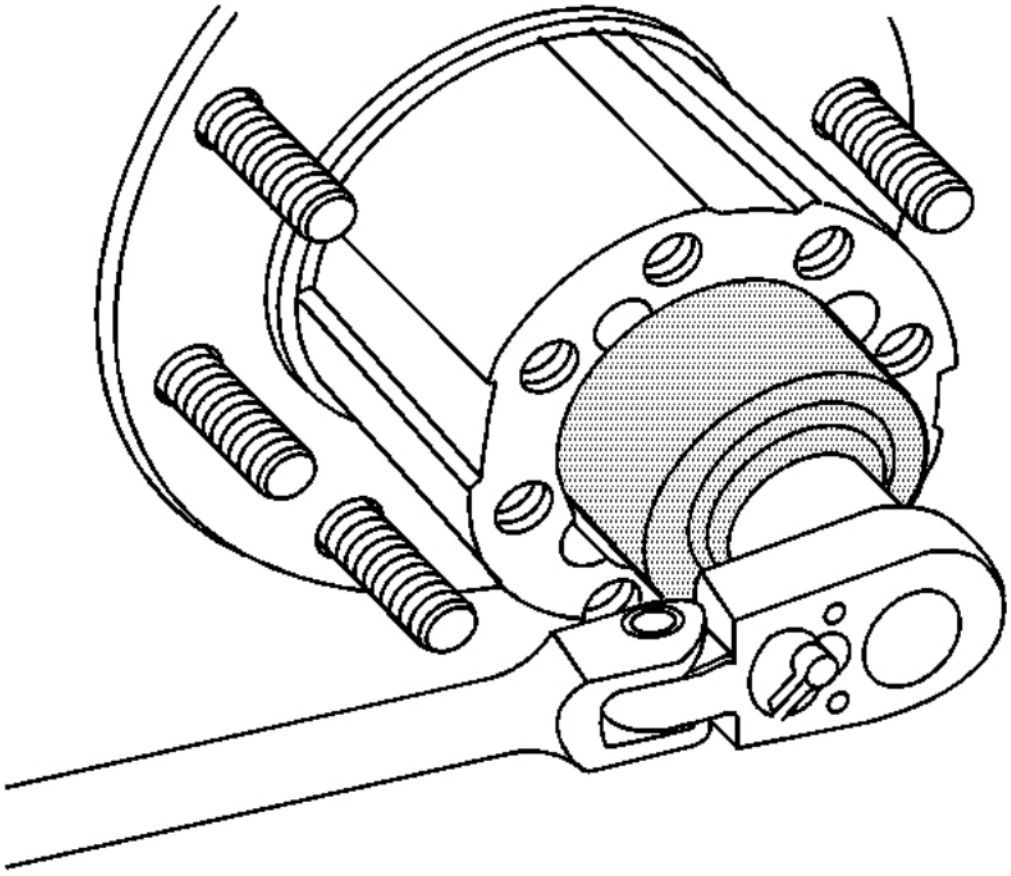


Fig. 90: View Of Adjusting Nut Using J 2222-C
Courtesy of GENERAL MOTORS CORP.

8. Remove the adjusting nut.

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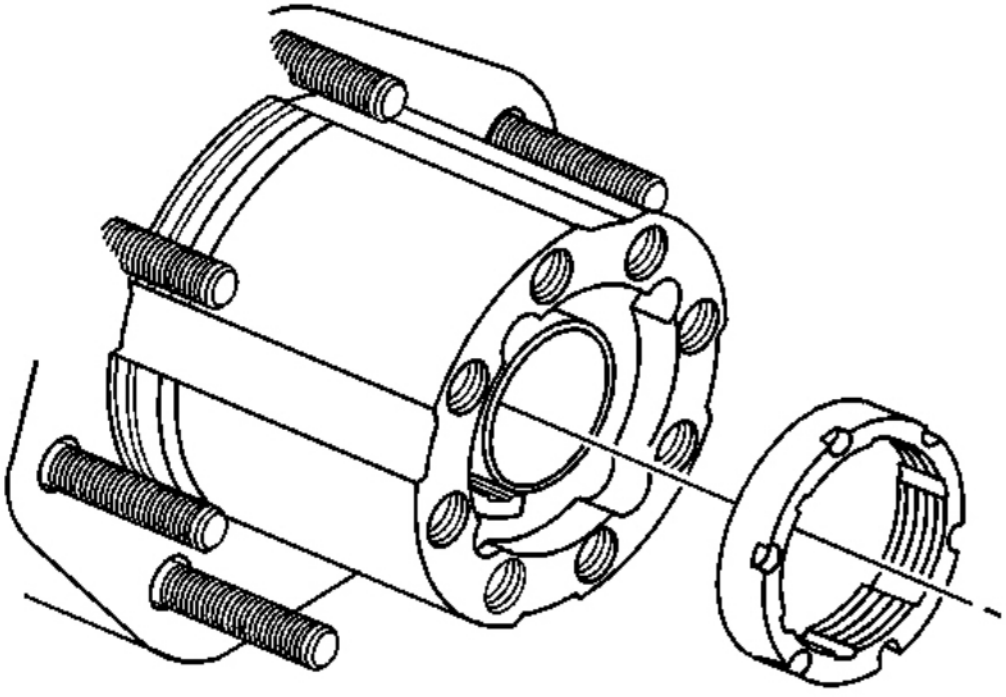


Fig. 91: View Of Adjusting Nut
Courtesy of GENERAL MOTORS CORP.

9. Remove the hub from the axle housing.

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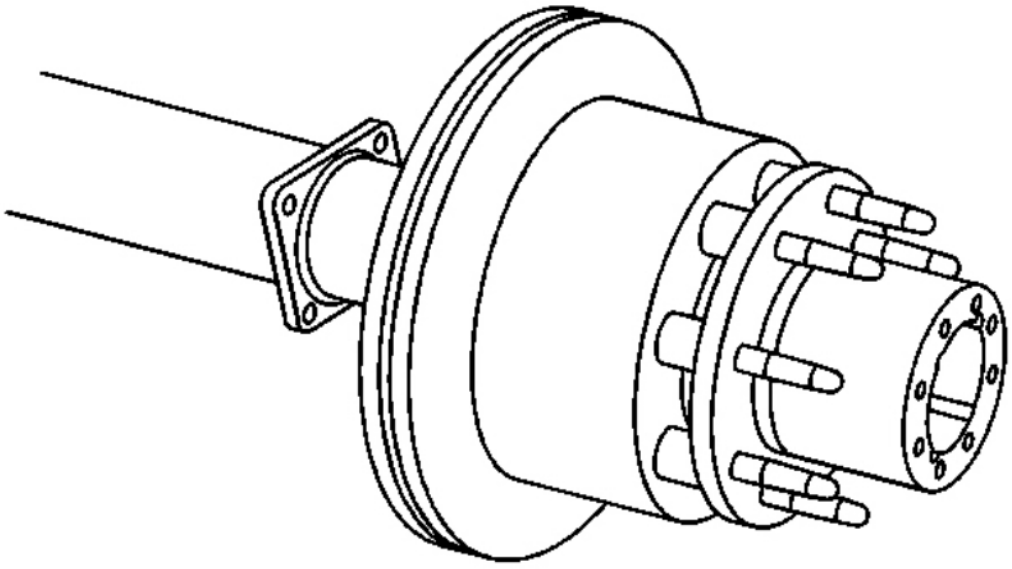


Fig. 92: View Of Wheel Hub & Axle Housing
Courtesy of GENERAL MOTORS CORP.

10. Remove the rotor, if necessary. Refer to **Brake Rotor Replacement - Rear (W/NYS)** or **Brake Rotor Replacement - Rear (W/O NYS)** in Disc Brakes.
11. Remove the oil seal from the wheel hub using a suitable seal removal tool.
12. Remove the inner hub bearing.

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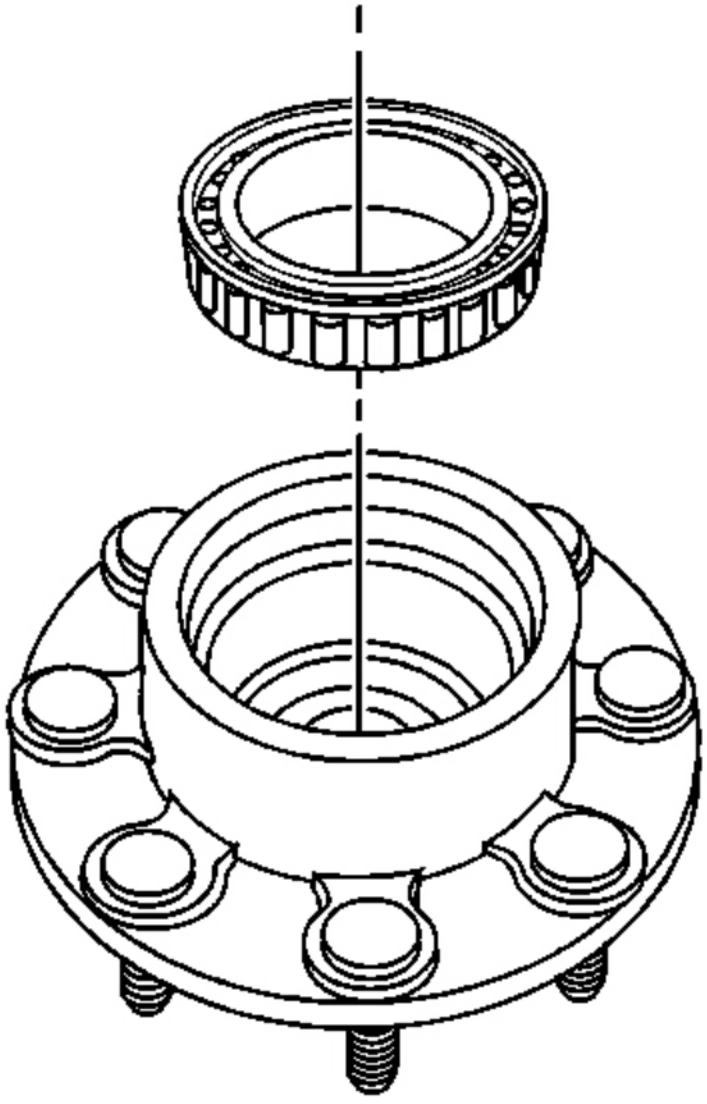


Fig. 93: View Of Inner Hub Bearing
Courtesy of GENERAL MOTORS CORP.

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

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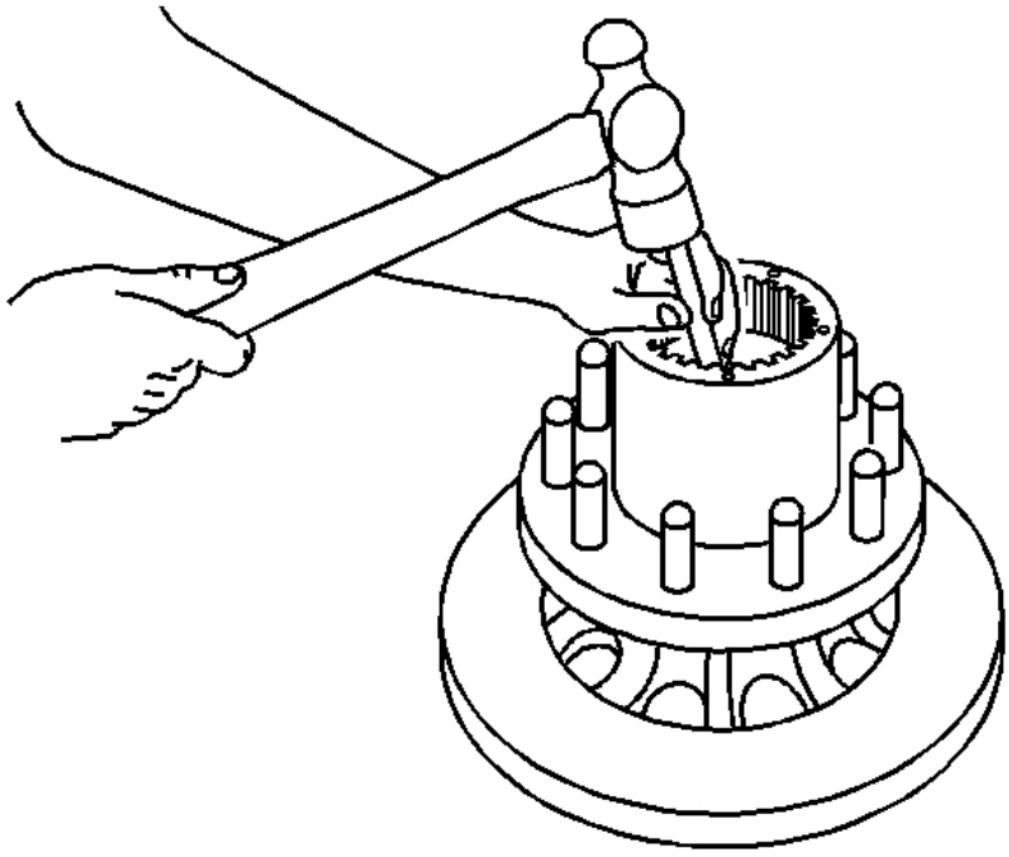


Fig. 94: Removing Inner Hub Bearing Cup
Courtesy of GENERAL MOTORS CORP.

14. Remove the retaining ring from the wheel hub.

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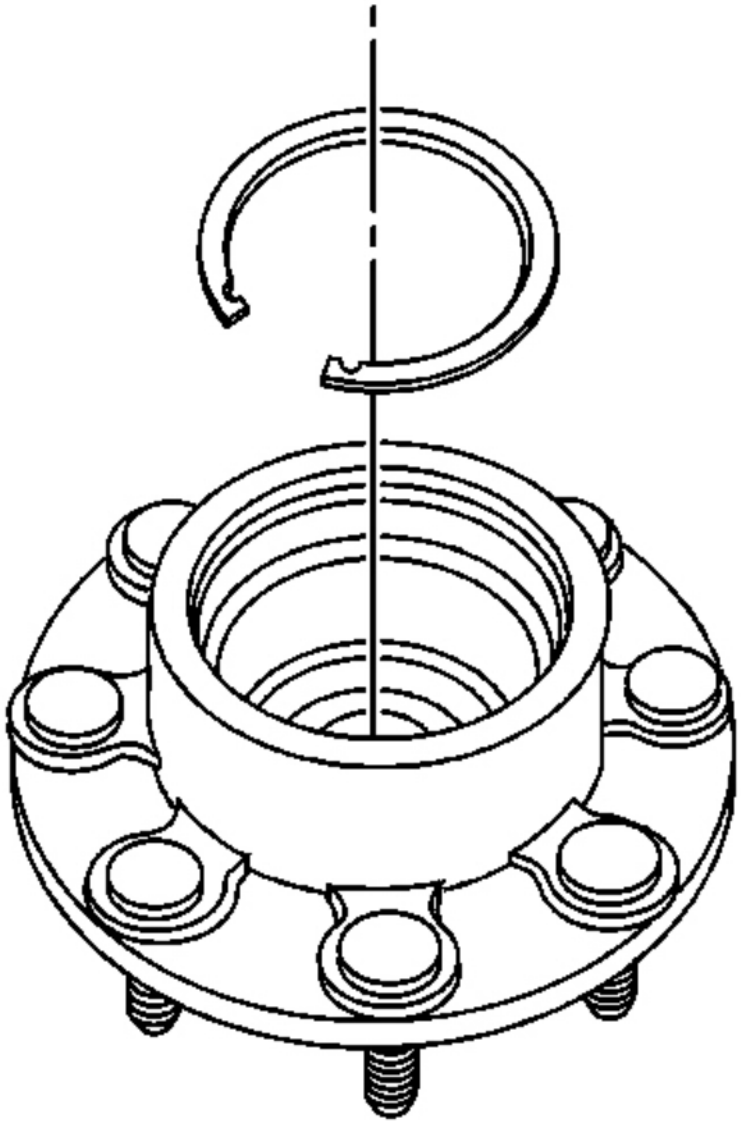


Fig. 95: View Of Retaining Ring & Wheel Hub
Courtesy of GENERAL MOTORS CORP.

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

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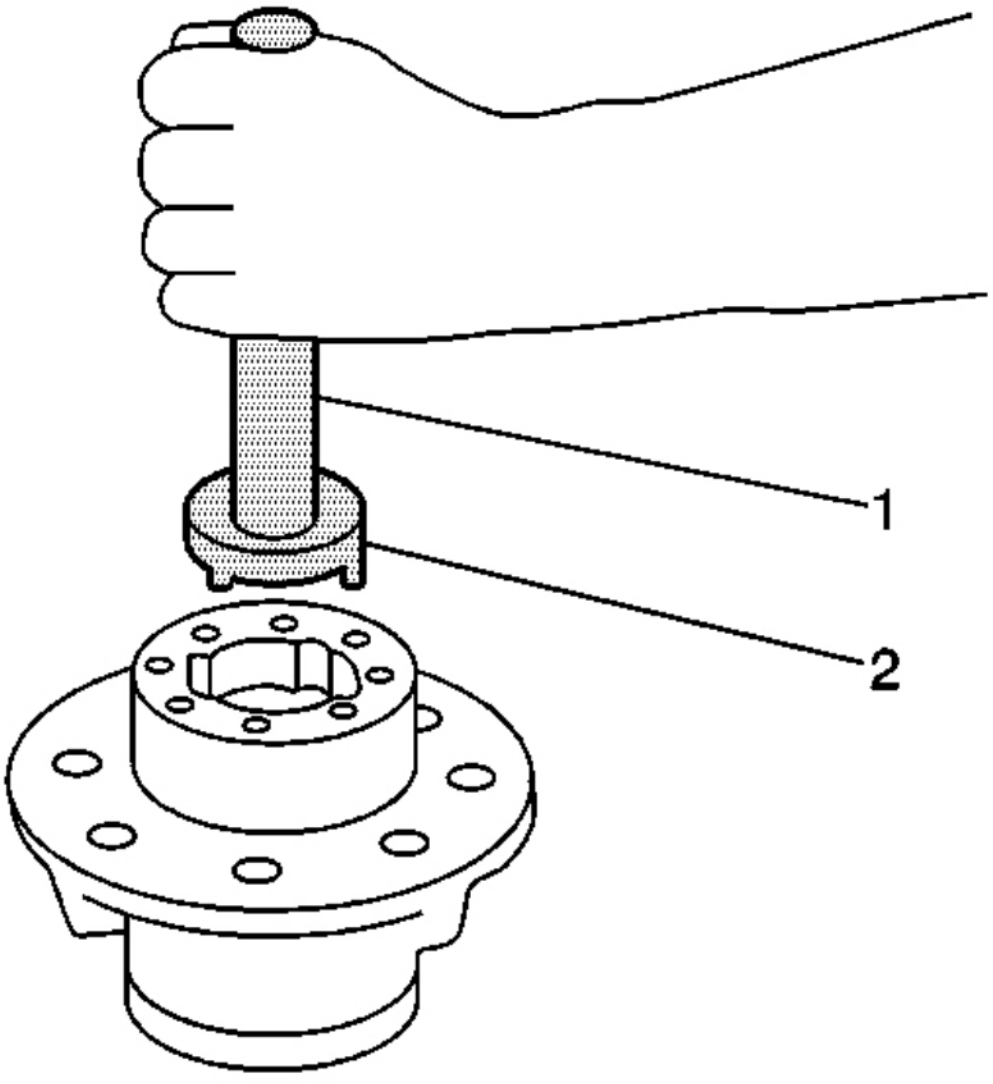


Fig. 96: Removing Outer Hub Bearing & Cup Using J 24426 & J 8092
Courtesy of GENERAL MOTORS CORP.

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

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- The outer wheel bearing cup
- The inner wheel bearing cup
- The axle housing

2. Install the outer bearing into the wheel hub.

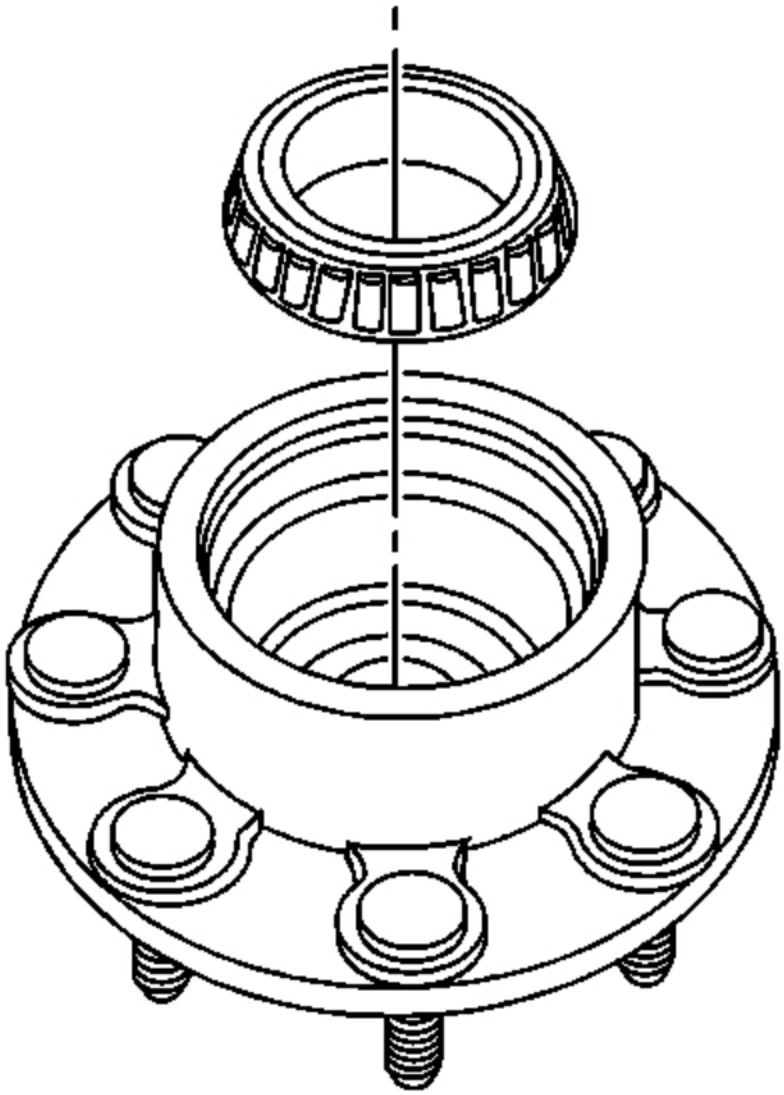


Fig. 97: View Of Outer Bearing & Wheel Hub
Courtesy of GENERAL MOTORS CORP.

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

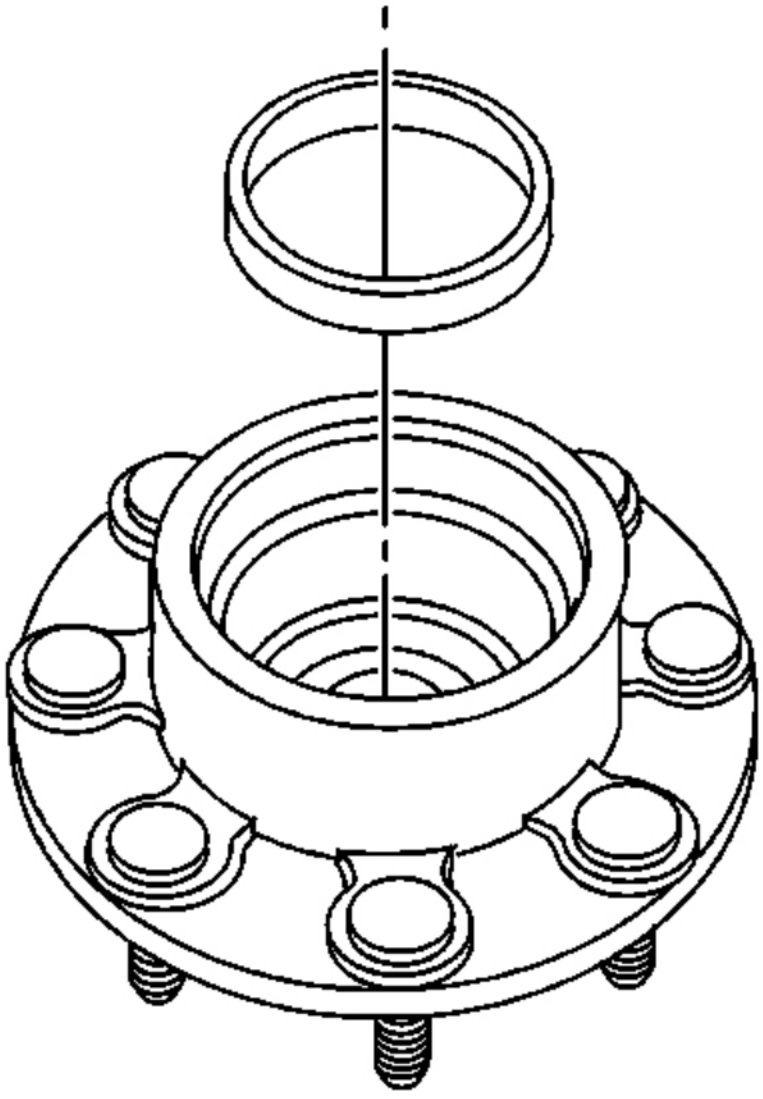


Fig. 98: View Of Outer Bearing Cup & Wheel Hub
Courtesy of GENERAL MOTORS CORP.

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

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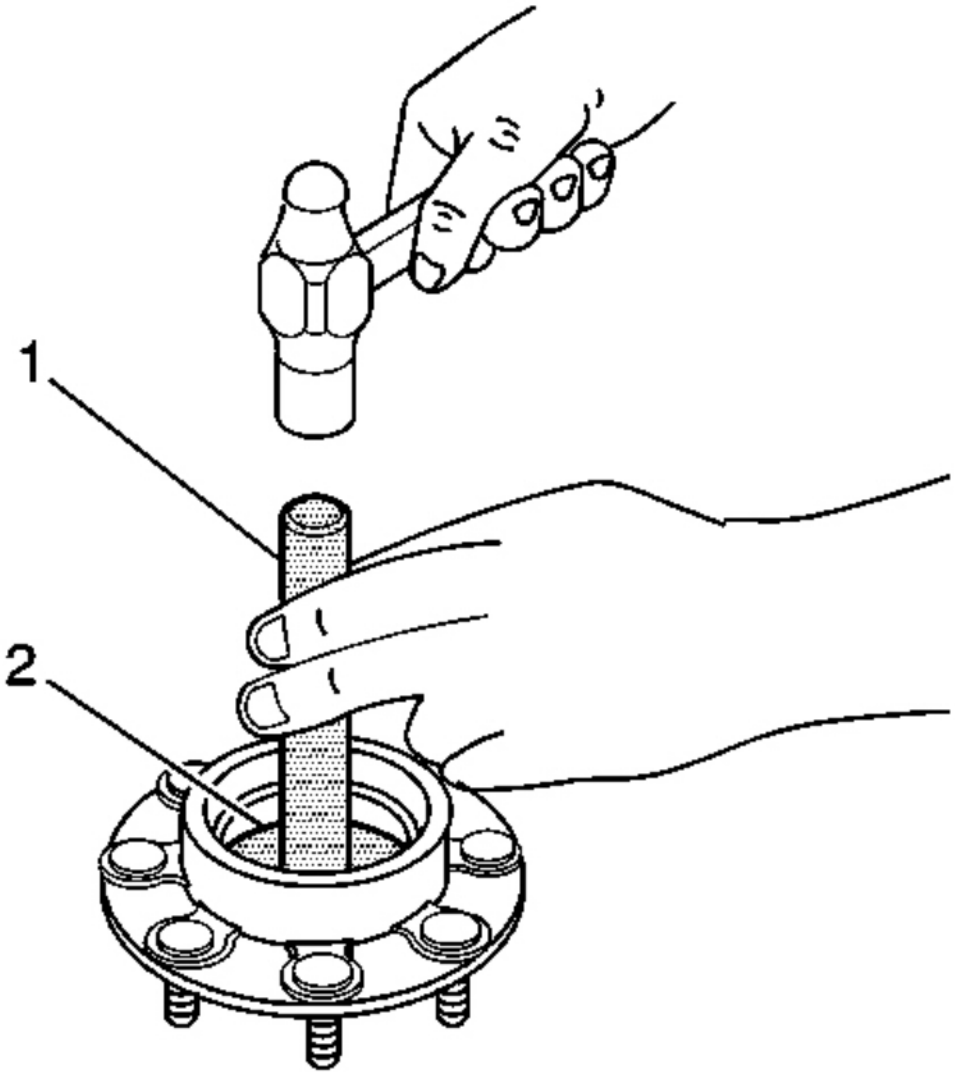


Fig. 99: Installing Bearing Cup Into Wheel Hub Using J 44419 & J 8092
Courtesy of GENERAL MOTORS CORP.

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

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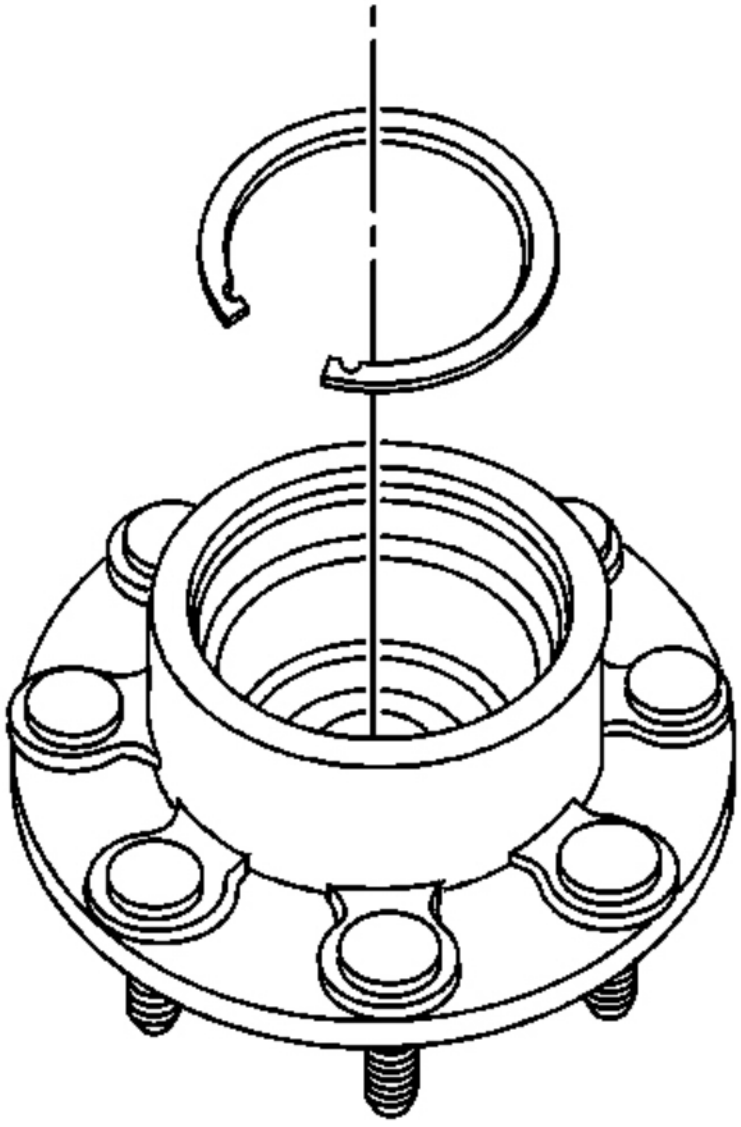


Fig. 100: View Of Retaining Ring & Wheel Hub
Courtesy of GENERAL MOTORS CORP.

6. Install the inner bearing cup.

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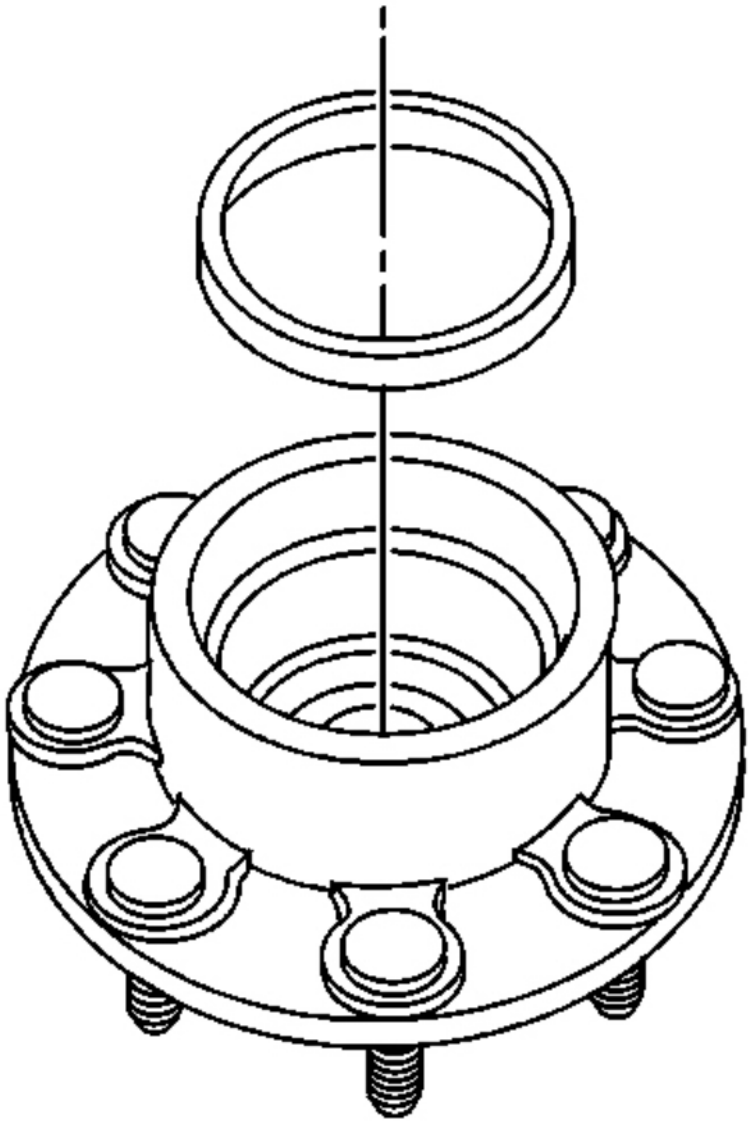


Fig. 101: View Of Inner Bearing Cup
Courtesy of GENERAL MOTORS CORP.

7. Drive the inner bearing cup into the wheel hub using the **J 24427** (2) and the **J 8092** (1).

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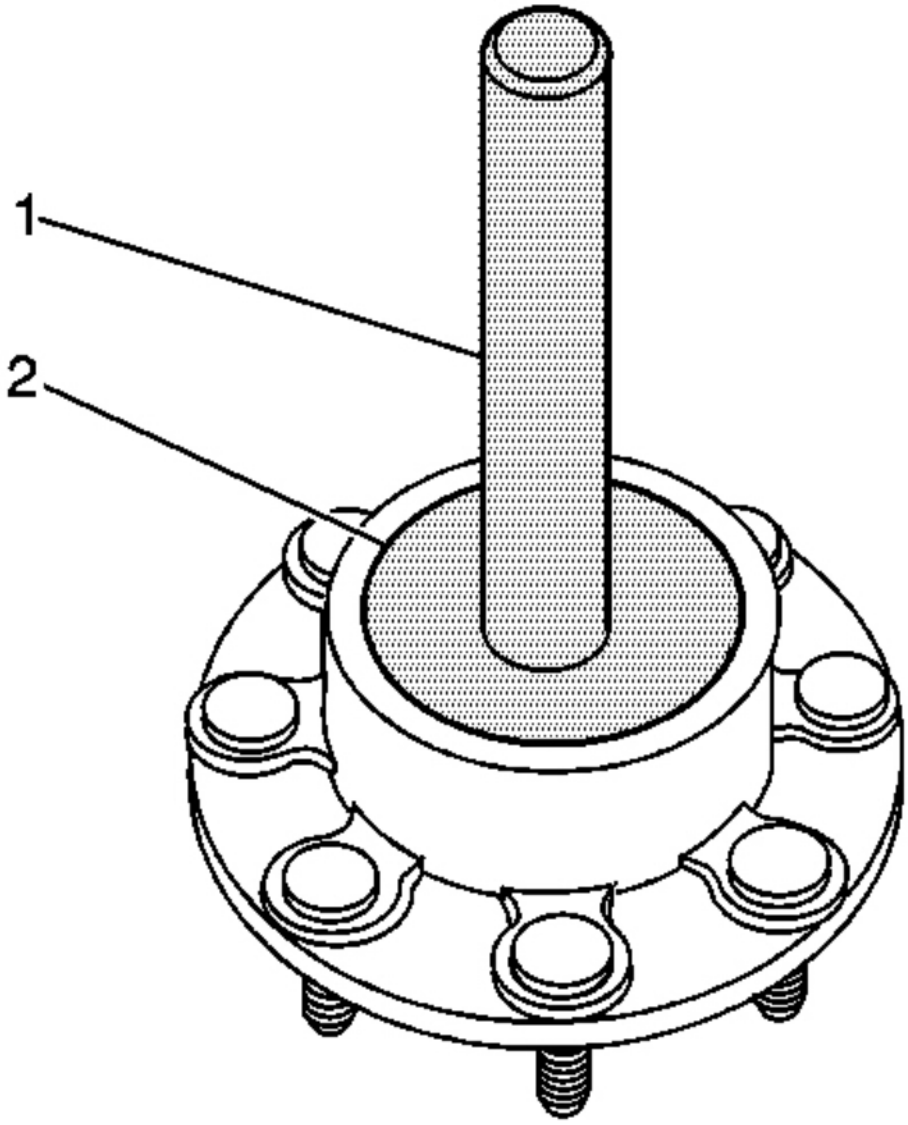


Fig. 102: Installing Inner Bearing Cup Into Wheel Hub Using J 24427 & J 8092
Courtesy of GENERAL MOTORS CORP.

8. Install the inner bearing.

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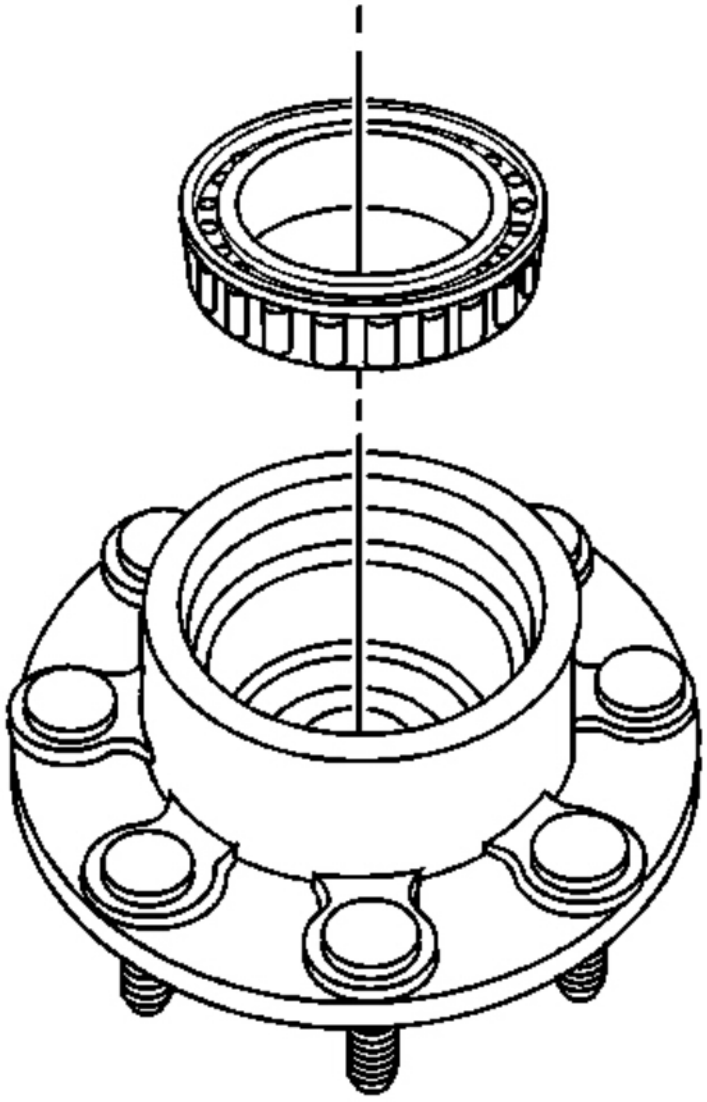


Fig. 103: View Of Inner Hub Bearing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Each time you replace the wheel hub bearings, install a new oil seal in order to prevent the wheel hub from leaking.

9. Install the new oil seal using the **J 44420** (2) and the **J 8092** (1).

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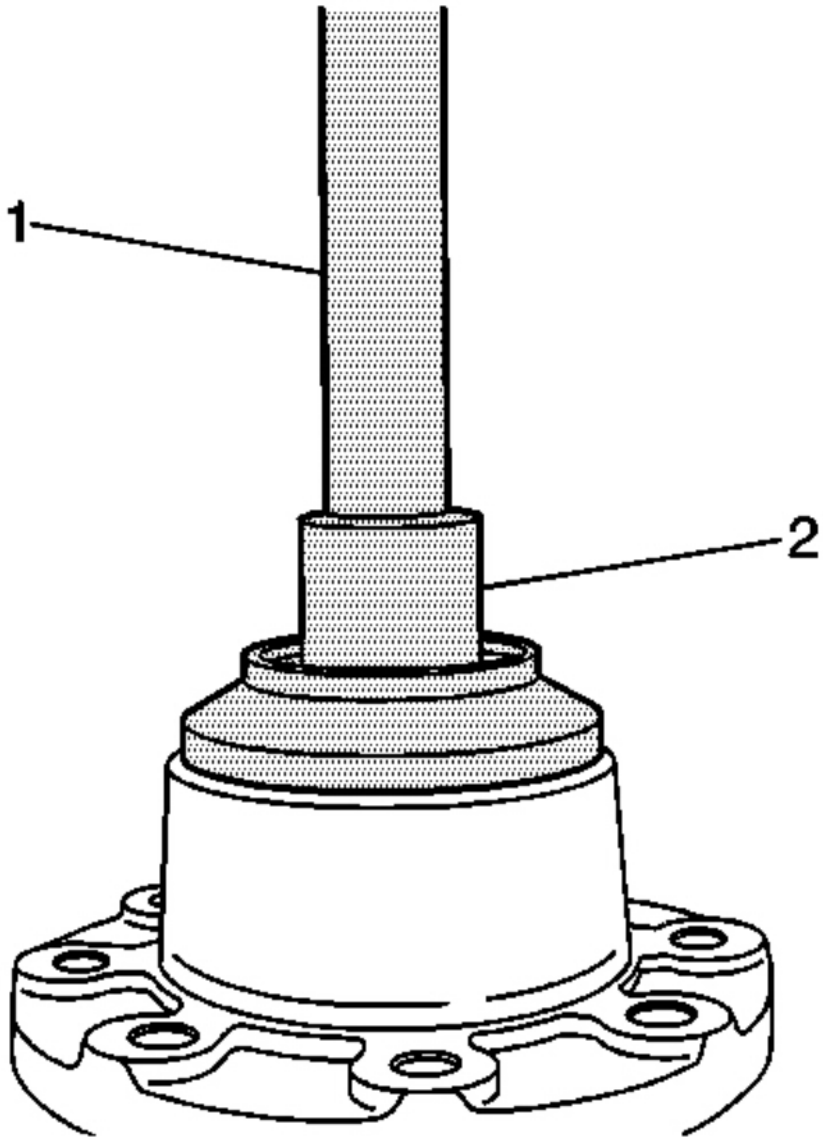


Fig. 104: Installing Oil Seal Using J 44420 & J 8092
Courtesy of GENERAL MOTORS CORP.

10. Install the rotor, if necessary. Refer to **Brake Rotor Replacement - Rear (W/NYS)** or **Brake Rotor Replacement - Rear (W/O NYS)** in Disc Brakes.
11. Apply a light coat of high melting point EP bearing lubricant to the axle housing spindle.
12. Install the wheel hub to the axle housing.

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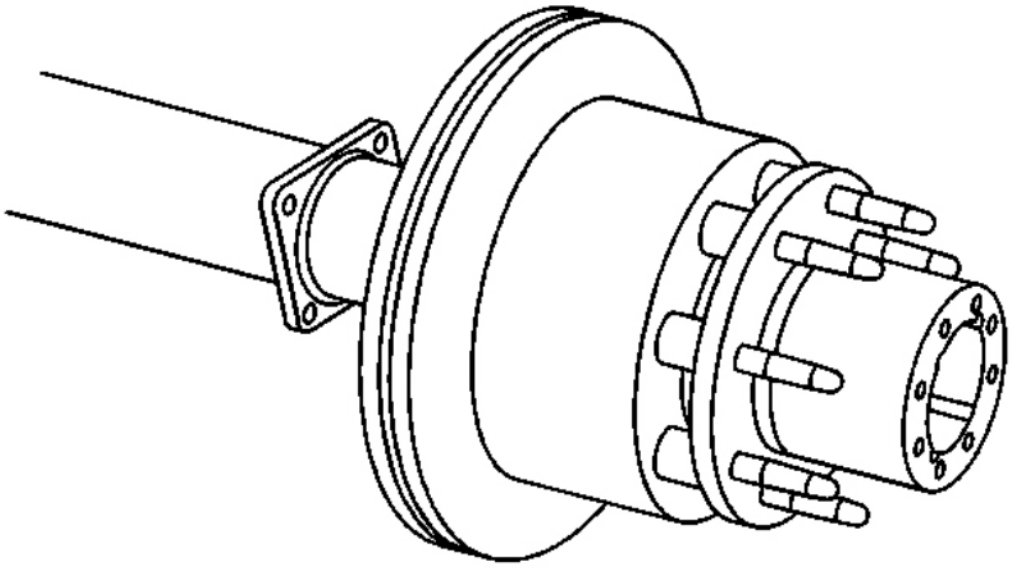


Fig. 105: View Of Wheel Hub & Axle Housing
Courtesy of GENERAL MOTORS CORP.

13. Install the adjusting nut to the hub using the J 2222-C .

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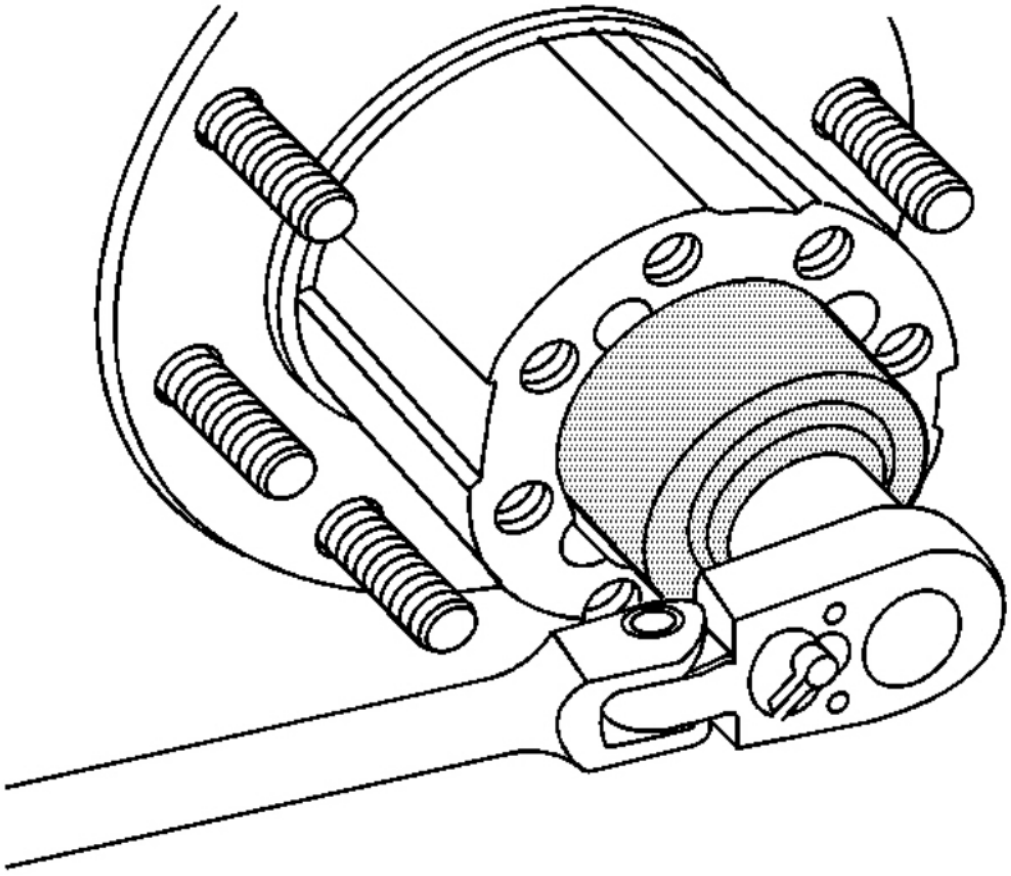


Fig. 106: View Of Adjusting Nut Using J 2222-C
Courtesy of GENERAL MOTORS CORP.

14. Adjust the wheel bearings. Refer to **Wheel Bearing Adjustment**.
15. Install the axle shaft. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
16. Install the brake caliper. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
17. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
18. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Lubricant Level Inspection - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.75 Inch Axle)**.
19. Lower the vehicle.

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

Tools Required

- **J 8614-01** Flange/Pulley Holding Tool. See **Special Tools and Equipment**.
- **J 22388** Pinion Oil Seal Installer - Rear (8.6 inch, 9.5 inch axle)
- **J 44414** Pinion Seal Installer (10.5 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** in General Information.
2. Remove the tire and wheel assemblies (8.6 inch, 9.5 inch axles). Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Remove the rear brake calipers (8.6 inch, 9.5 inch axles). Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
4. Remove the brake rotors (8.6 inch, 9.5 inch axles). Refer to **Brake Rotor Replacement - Rear (W/NYS)** or **Brake Rotor Replacement - Rear (W/O NYS)** in Disc Brakes.
5. Remove the axle shafts (10.5 inch axle). Refer to **Rear Axle Shaft and/or Gasket Replacement**.
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.

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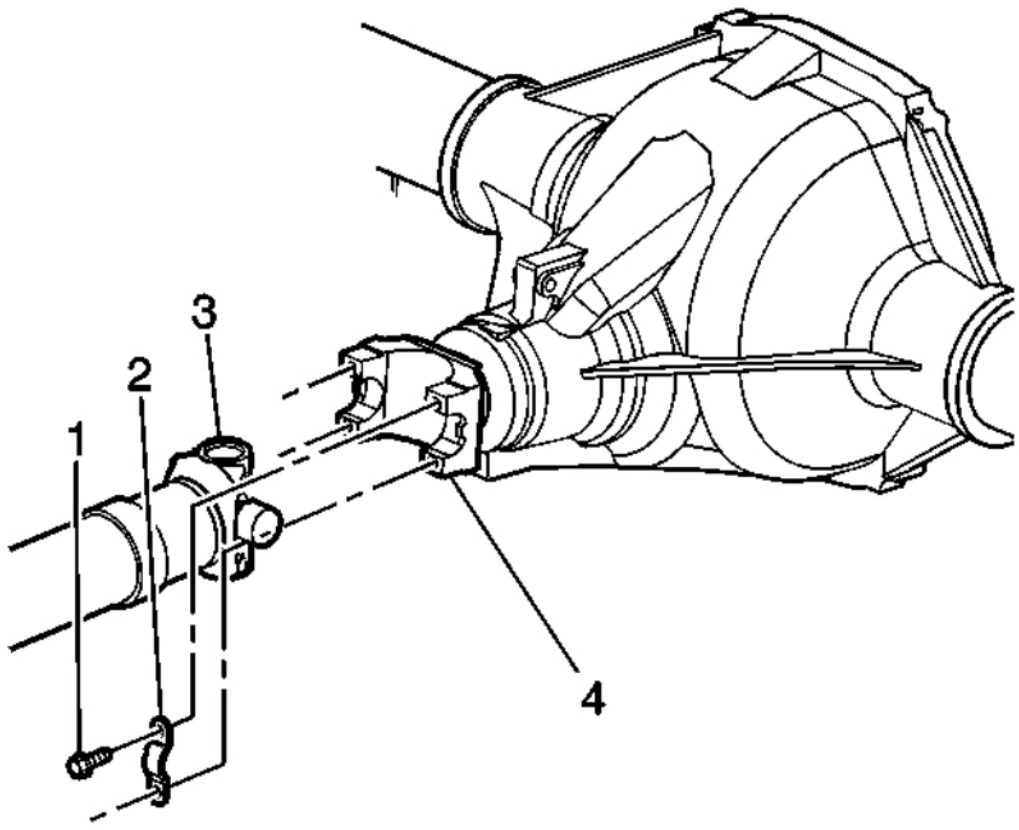


Fig. 107: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

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)

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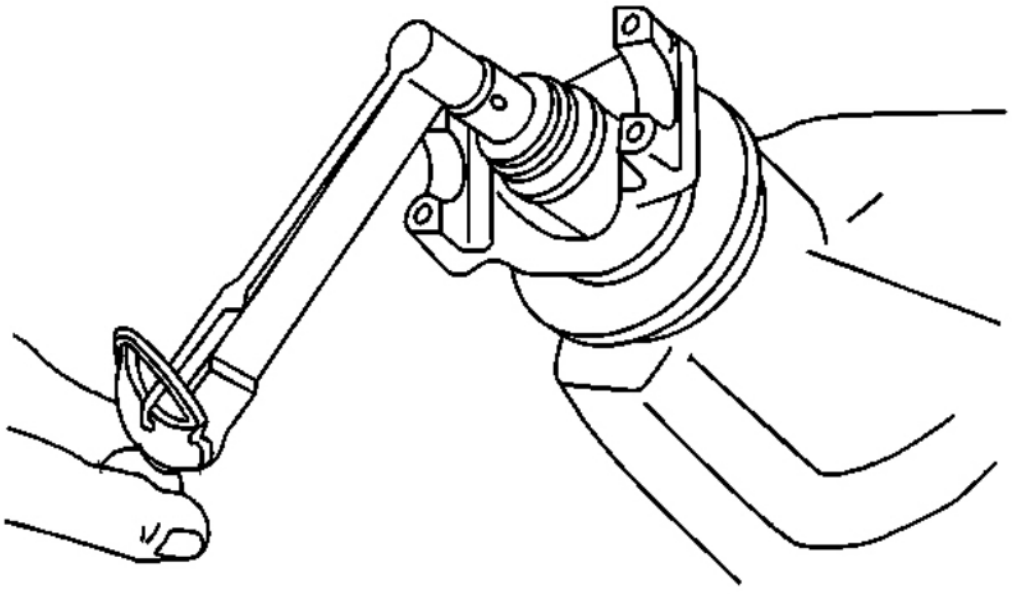


Fig. 108: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

9. Draw 2 arrows pointing at each other, one on the pinion stem, the other on the pinion yoke.
10. Record the number of exposed threads on the pinion stem for reference.
11. Install the **J 8614-01** as shown.
12. Remove the pinion nut while holding the **J 8614-01** .

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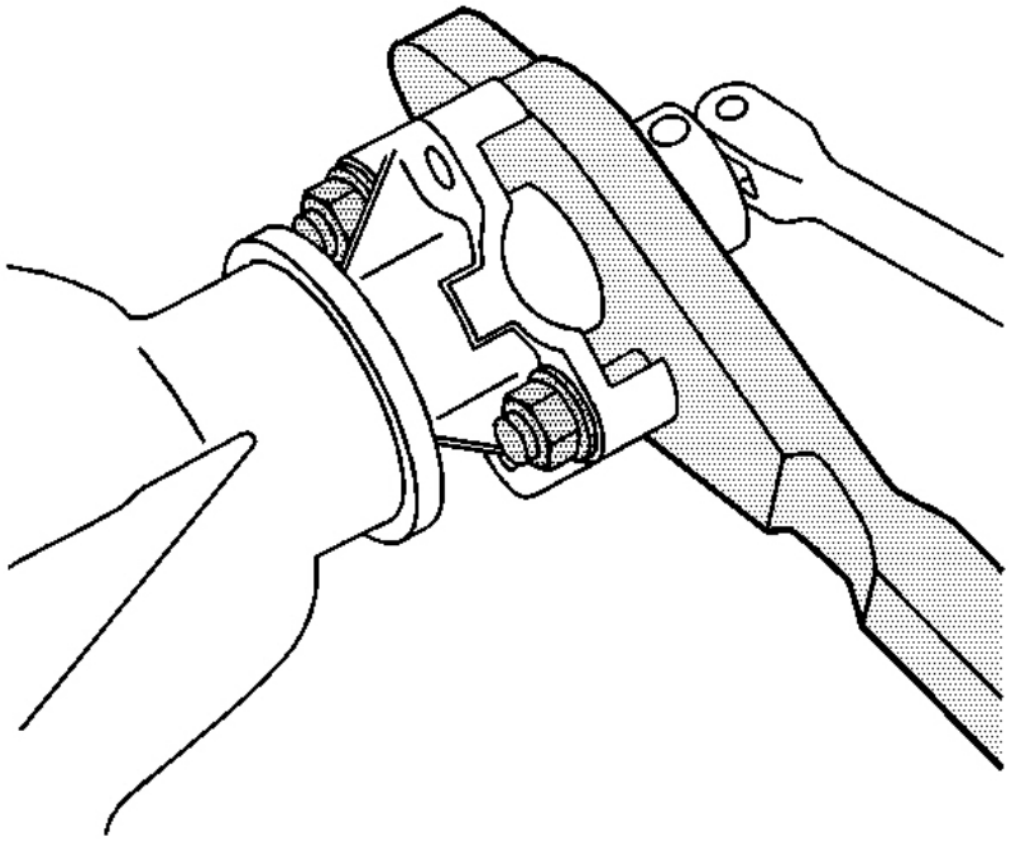


Fig. 109: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

13. Remove the washer.
14. Install the J 8614-2 (2) and the J 8614-3 (3) into the **J 8614-01** (1) as shown.
15. 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.

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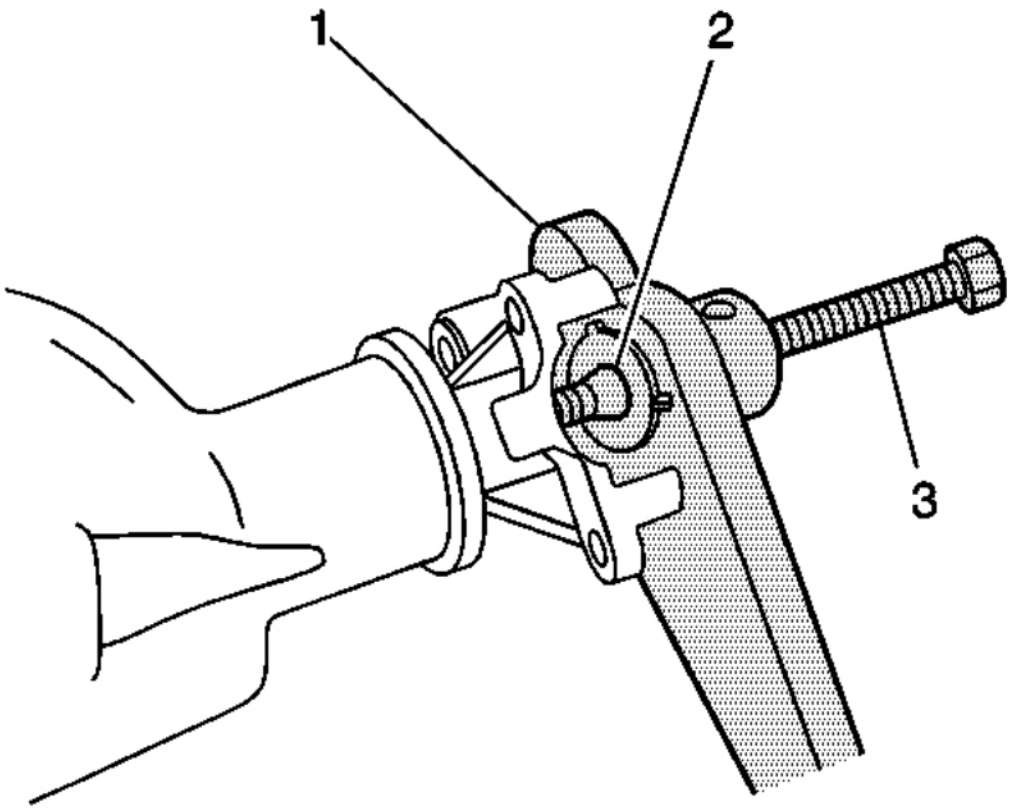


Fig. 110: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

1. Install a new pinion oil seal using the **J 22388** or the **J 44414** . See **Special Tools and Equipment**.

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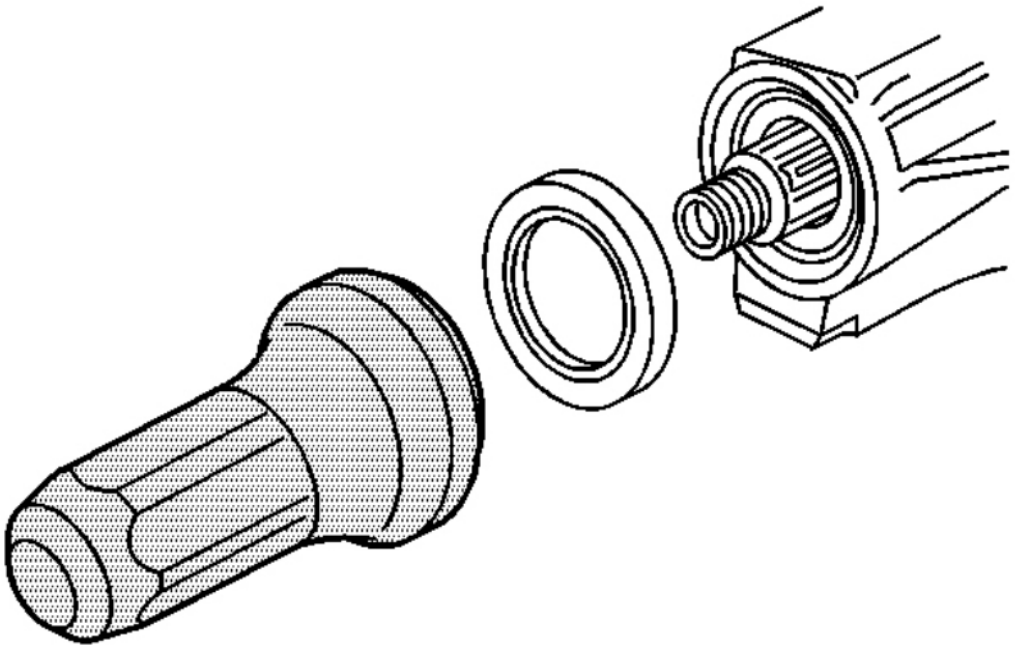


Fig. 111: Installing Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

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 in Cautions and Notices.

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

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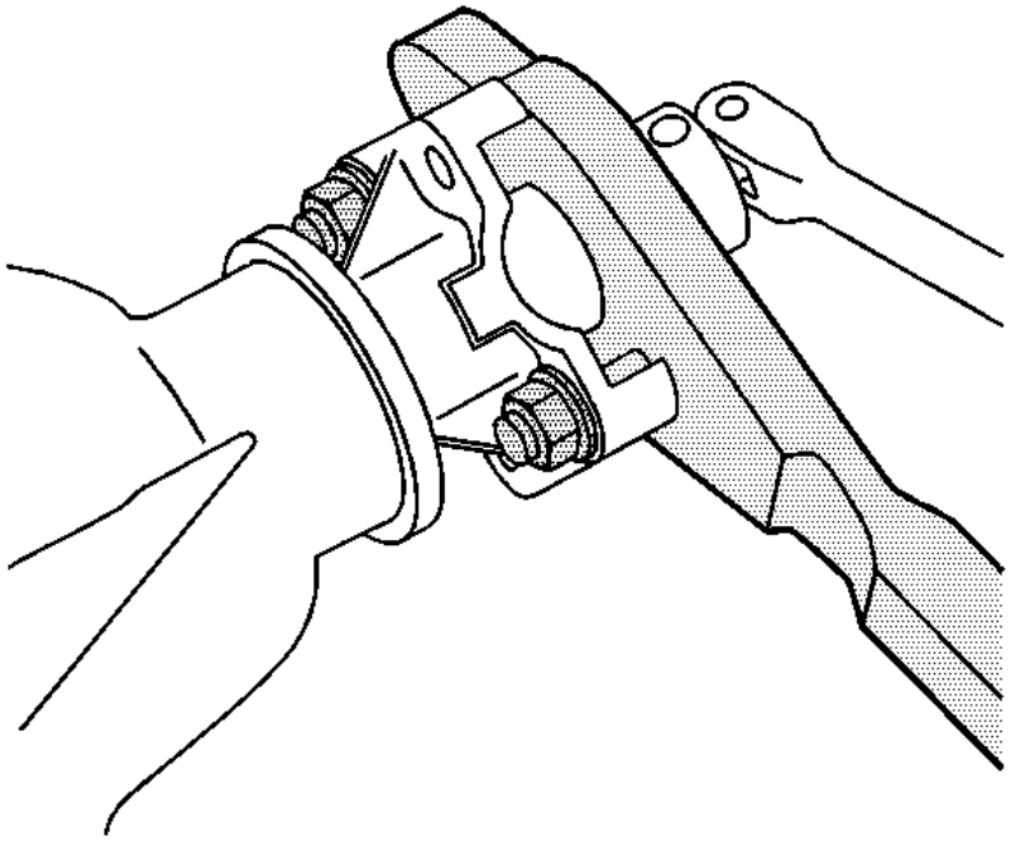


Fig. 112: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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.

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

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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.

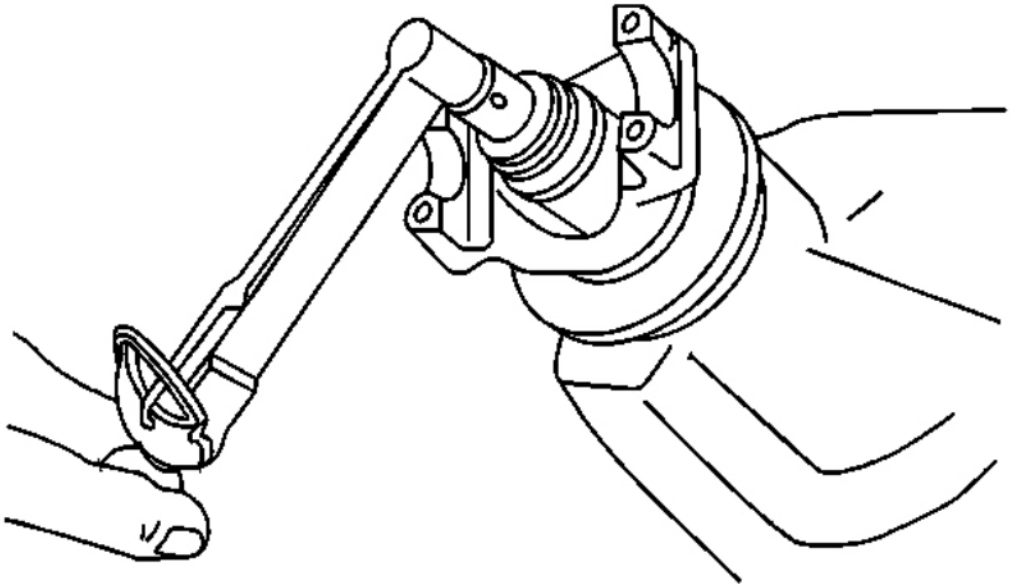


Fig. 113: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

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.
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).

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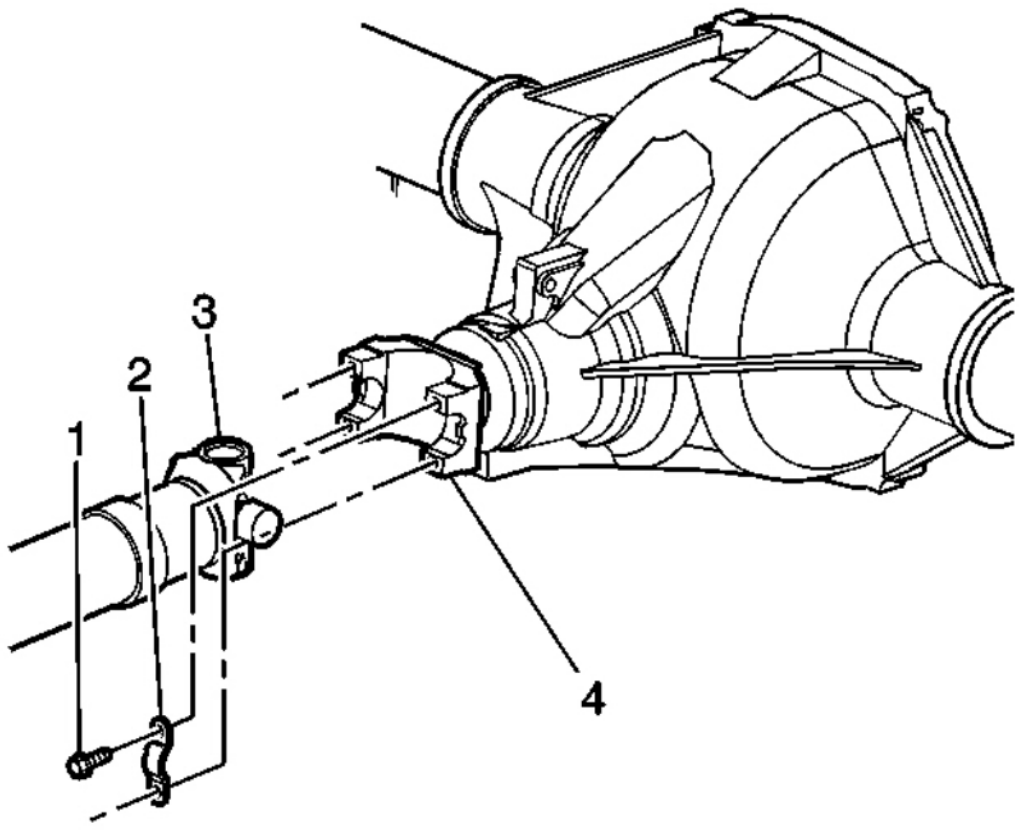


Fig. 114: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

12. Install the axle shafts (10.5 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 **Brake Rotor Replacement - Rear (W/NYS)** or **Brake Rotor Replacement - Rear (W/O NYS)** in Disc Brakes.
14. Install the brake calipers (8.6 inch, 9.5 inch axles). Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
15. Install the tire and the wheel. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
16. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Lubricant Level Inspection - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.75 Inch Axle)**.
17. Lower the vehicle.

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

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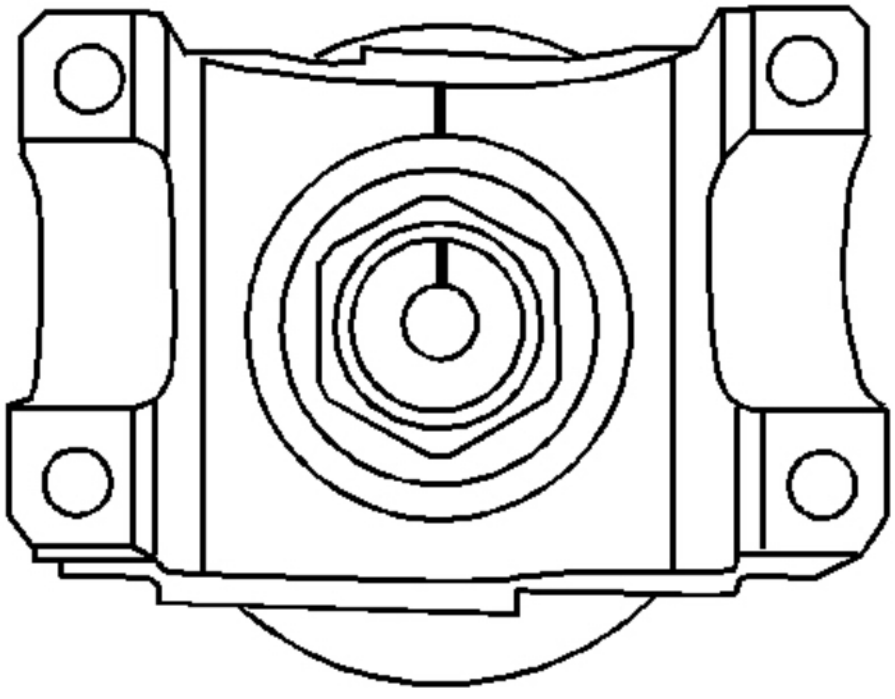
Tools Required

- **J 8614-01** Flange and Pulley Holding Tool. See **Special Tools and Equipment**.
- **J 45710** Pinion Bearing Oil Seal Installer

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** in General Information.
2. Disconnect the propeller shaft from the rear axle pinion yoke. Refer to **Propeller Shaft Replacement - Rear** in Propeller Shaft.
3. Place an alignment mark between the pinion and the pinion yoke.



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Fig. 115: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

4. Install the **J 8614-01** as shown.
5. Remove the pinion nut while holding the **J 8614-01** .

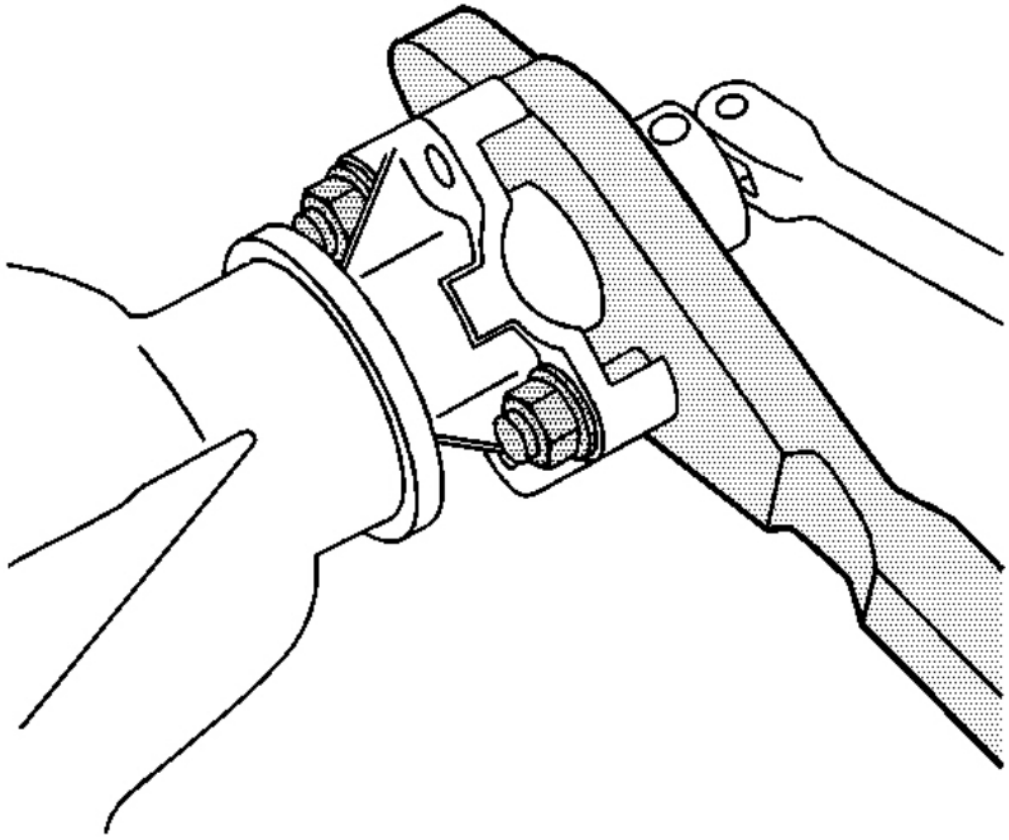


Fig. 116: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

6. Remove the washer.

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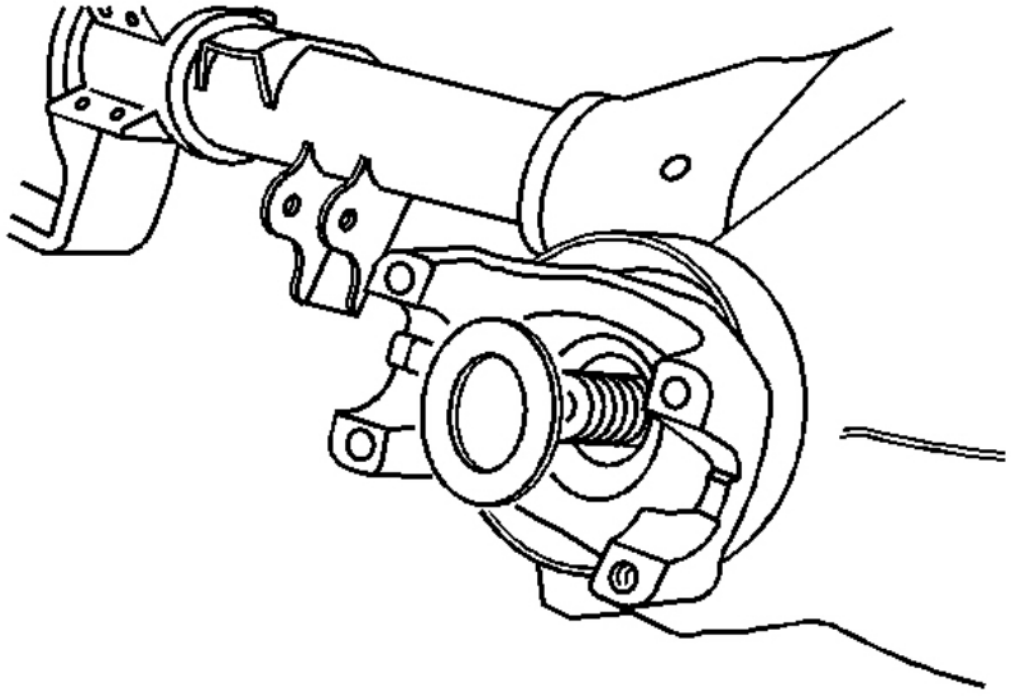


Fig. 117: View Of Washer
Courtesy of GENERAL MOTORS CORP.

7. Install the J 8614-2 (2) and the J 8614-3 (3) into the **J 8614-01** (1) as shown.
8. 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.

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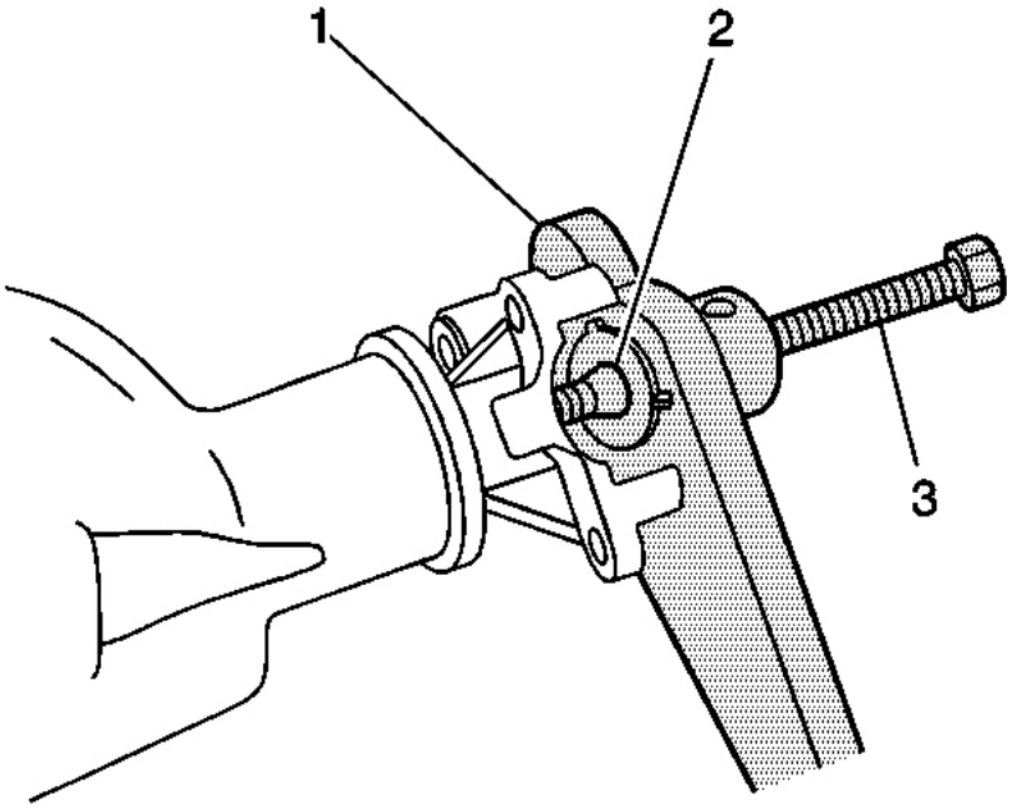


Fig. 118: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

1. Apply a light coat of axle lubricant, GM P/N 12378557 or equivalent meeting GM Specification 9986207, to the lip of the pinion seal.
2. Install the new seal using the **J 45710** . See **Special Tools and Equipment**.

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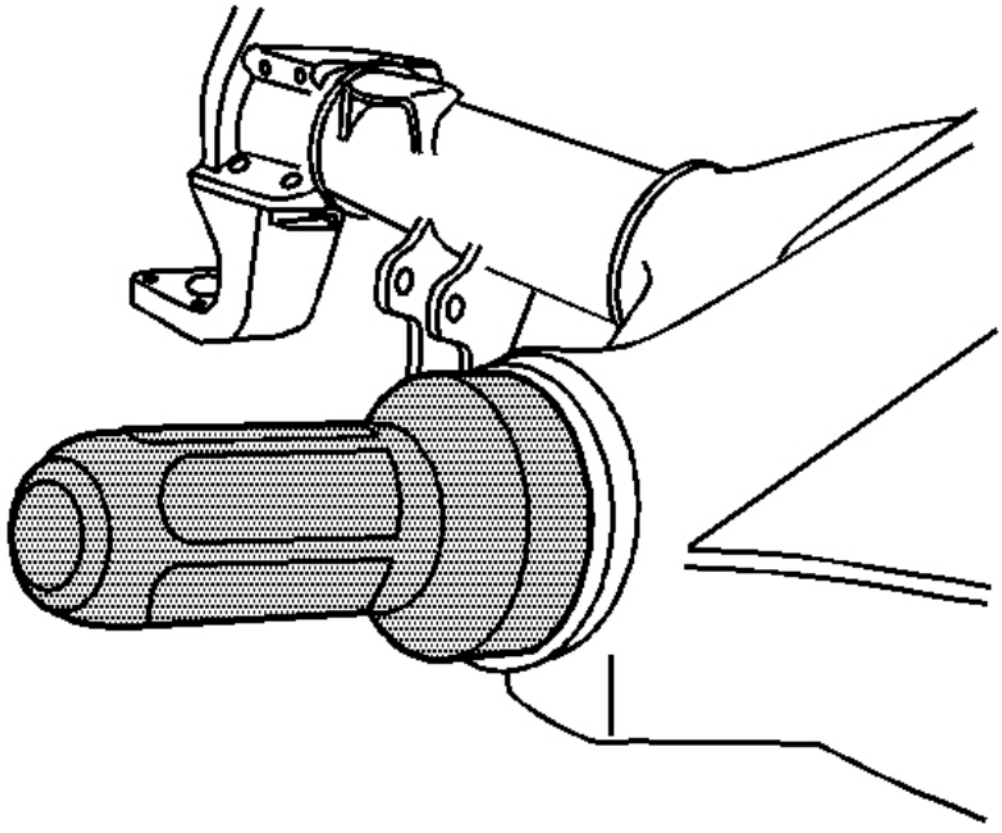


Fig. 119: Installing Seal Using J 45710
Courtesy of GENERAL MOTORS CORP.

3. Install the pinion yoke.

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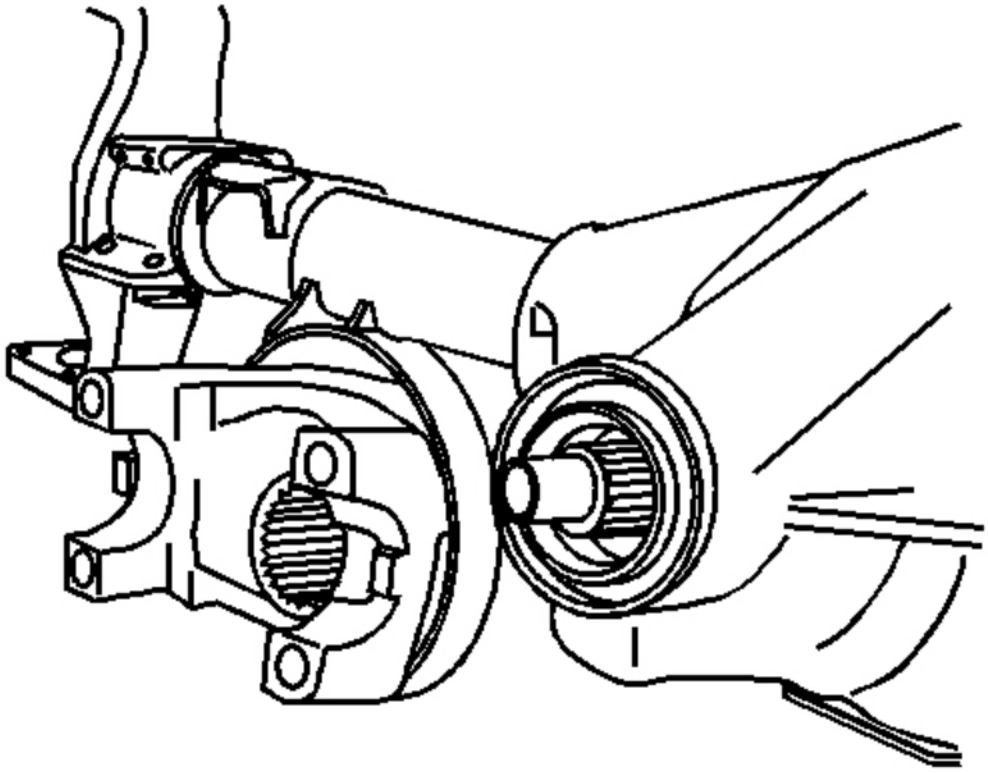


Fig. 120: View Of Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Pinion Flange/Yoke Installation Notice in Cautions and Notices.

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.

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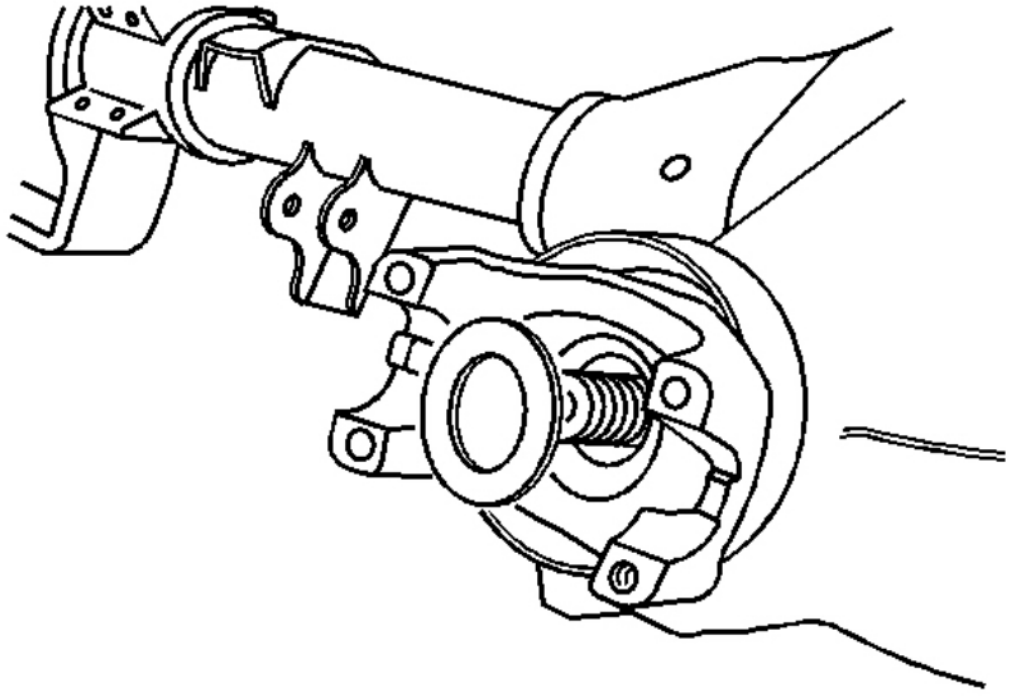


Fig. 121: View Of Washer
Courtesy of GENERAL MOTORS CORP.

6. Install the new pinion nut

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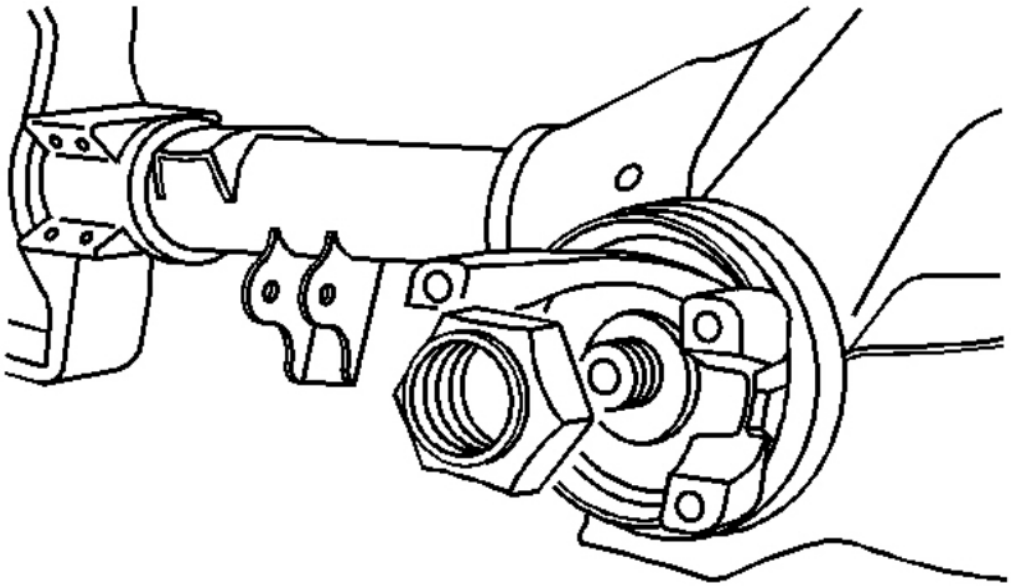


Fig. 122: View Of Pinion Nut
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice in Cautions and Notices.

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

Tighten: Tighten the pinion nut to 370 N.m (273 lb ft).

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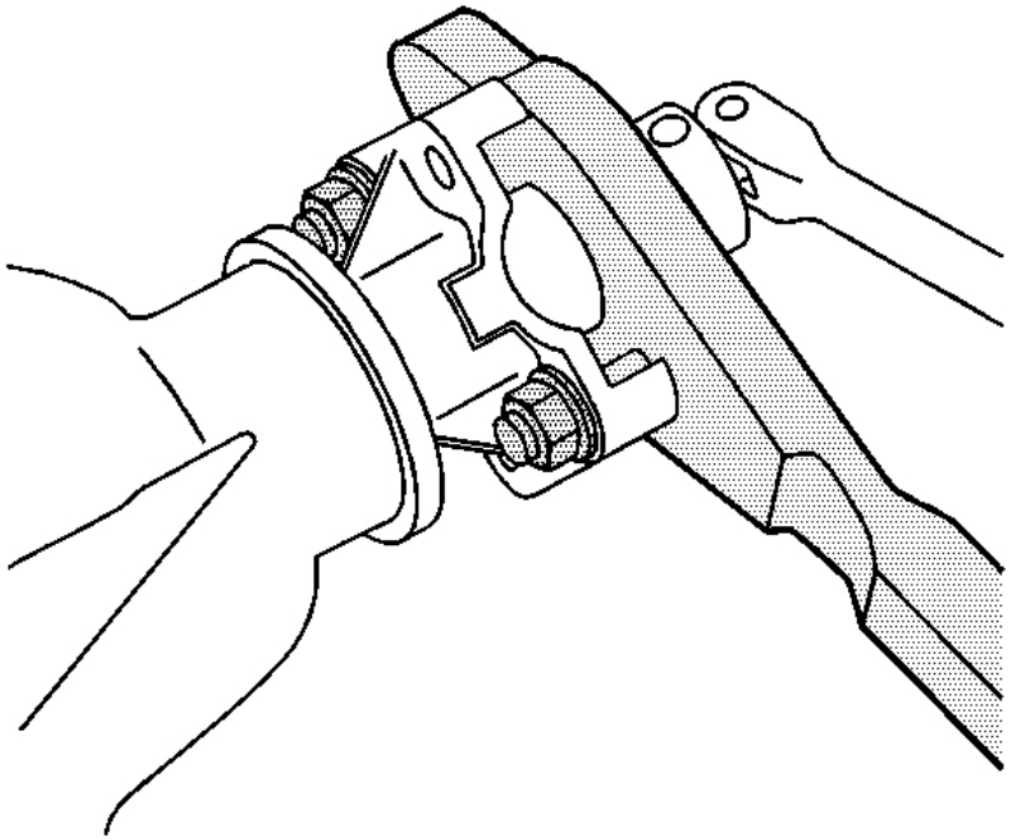


Fig. 123: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

9. Install the propeller shaft to the rear axle pinion yoke. Refer to **Propeller Shaft Replacement - Rear** in Propeller Shaft.
10. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Lubricant Level Inspection - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.75 Inch Axle)**.
11. Lower the vehicle.

DRIVE PINION HOUSING AND/OR SEAL REPLACEMENT

Tools Required

- **J 44414** Pinion Seal Installer. See **Special Tools and Equipment**.
- **J 22912-01** Split-Plate Bearing Puller

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- **J 24433** Pinion Cone and Side Bearing Installer
- **J 37624** Pinion Bearing Installer
- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 8608** Rear Pinion Bearing Race Installer
- **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** in General Information.
2. Drain the axle lubricant. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
3. Remove the axle shafts. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
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.

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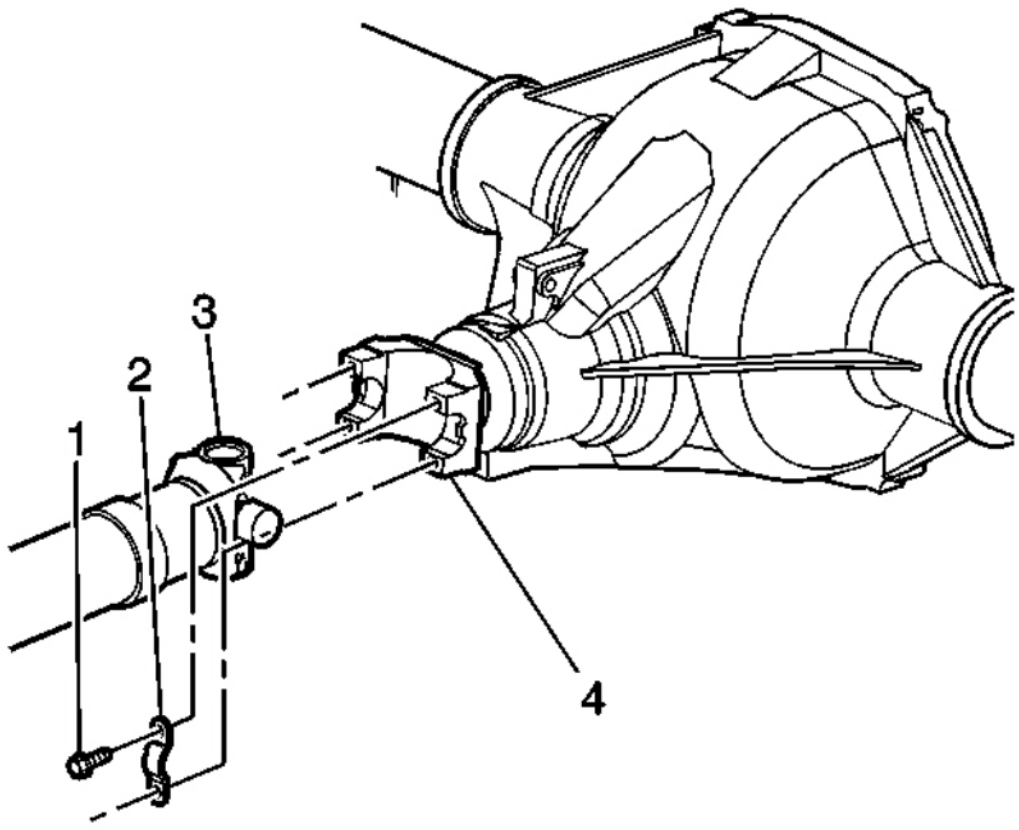


Fig. 124: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

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

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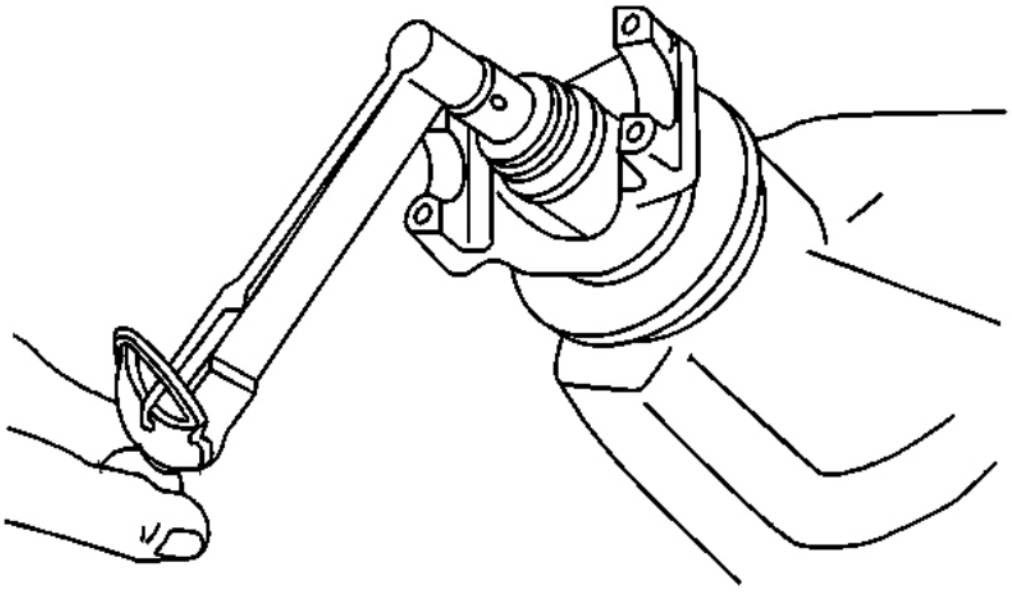


Fig. 125: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

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

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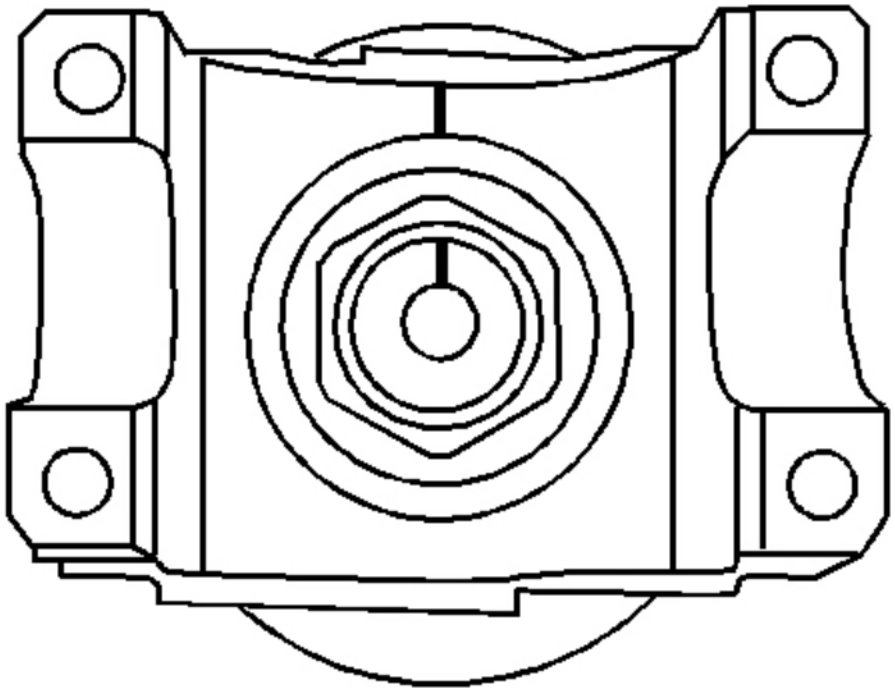


Fig. 126: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

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

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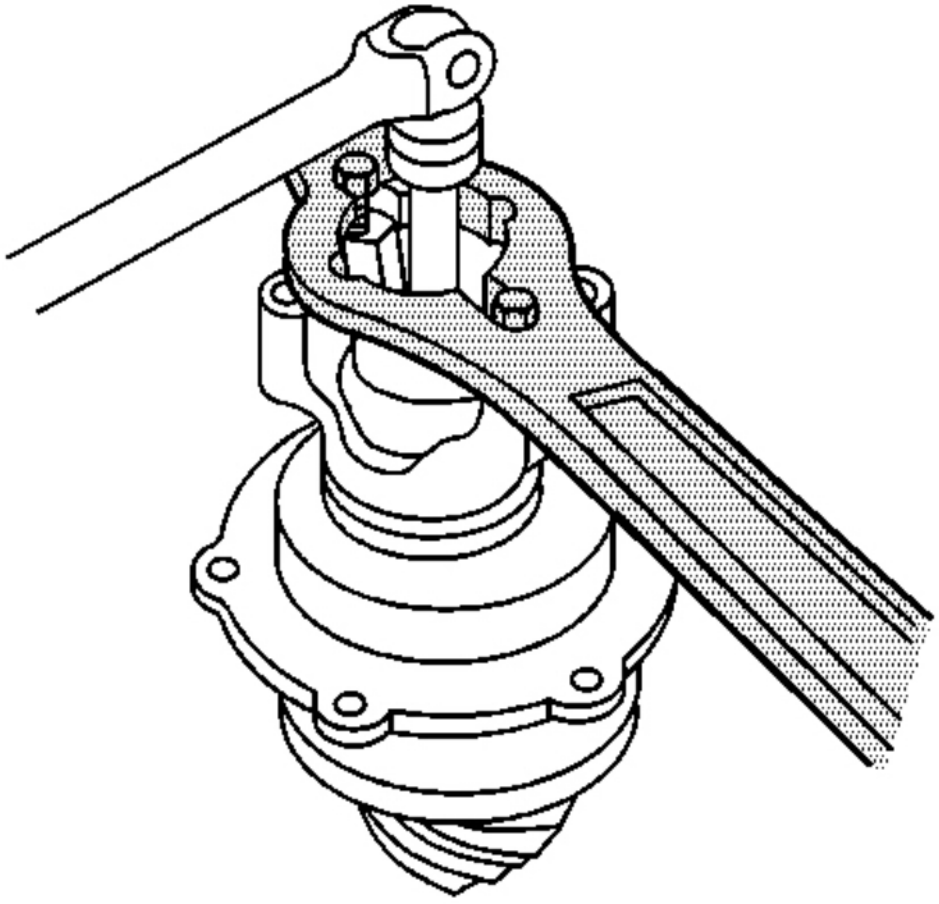


Fig. 127: Installing J 8614-01 Onto Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

14. Remove the washer.
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).

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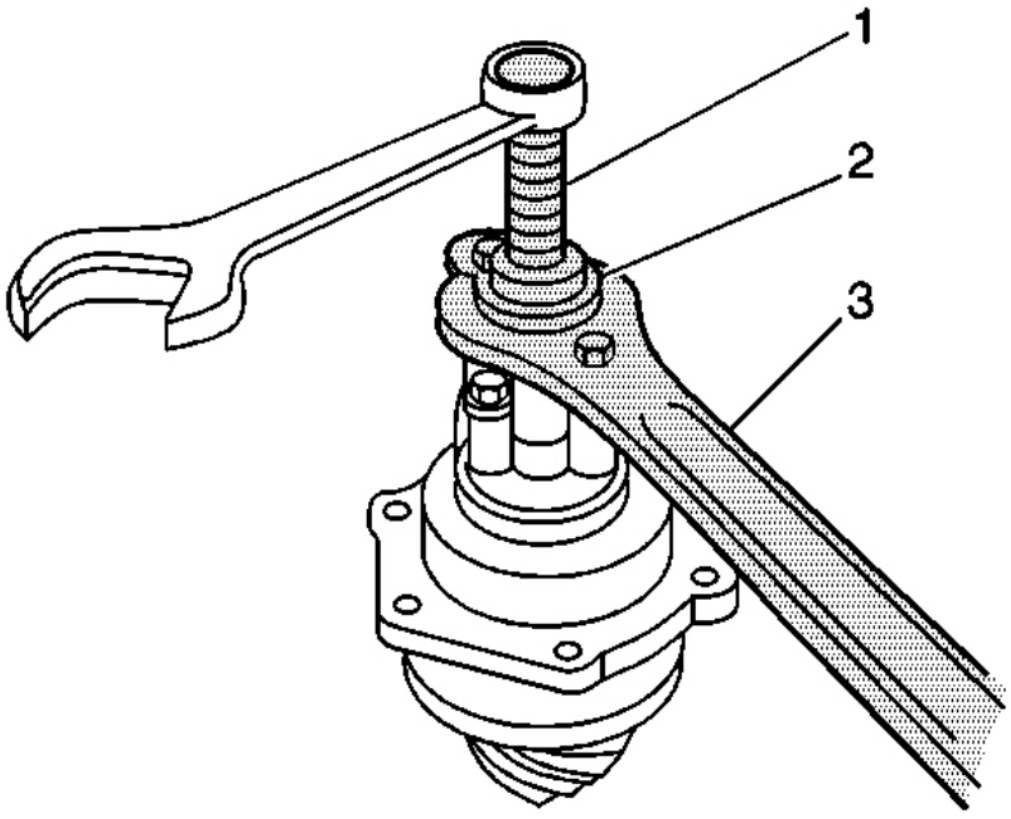


Fig. 128: View Of J 8614-2, J 8614-3 & J 8614-01
Courtesy of GENERAL MOTORS CORP.

17. Remove the pinion oil seal. Use a suitable seal removal tool. Do not damage the housing.
18. Remove the outer pinion bearing.
19. Remove the pinion.

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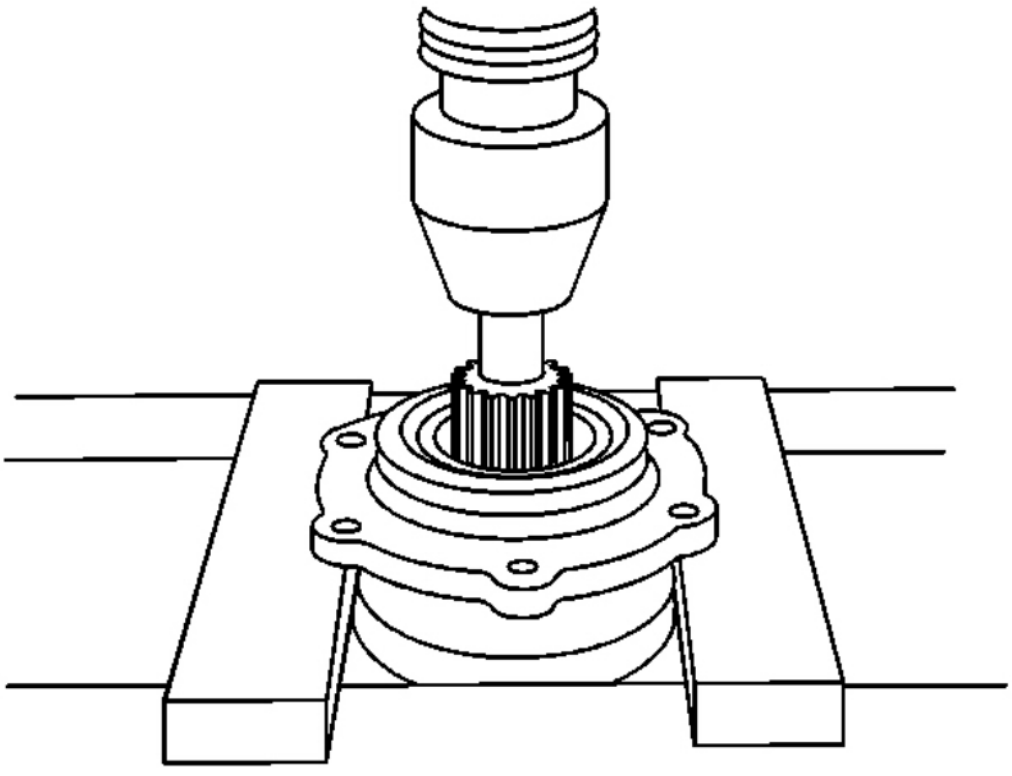


Fig. 129: View Of Pinion
Courtesy of GENERAL MOTORS CORP.

20. Remove the collapsible spacer.

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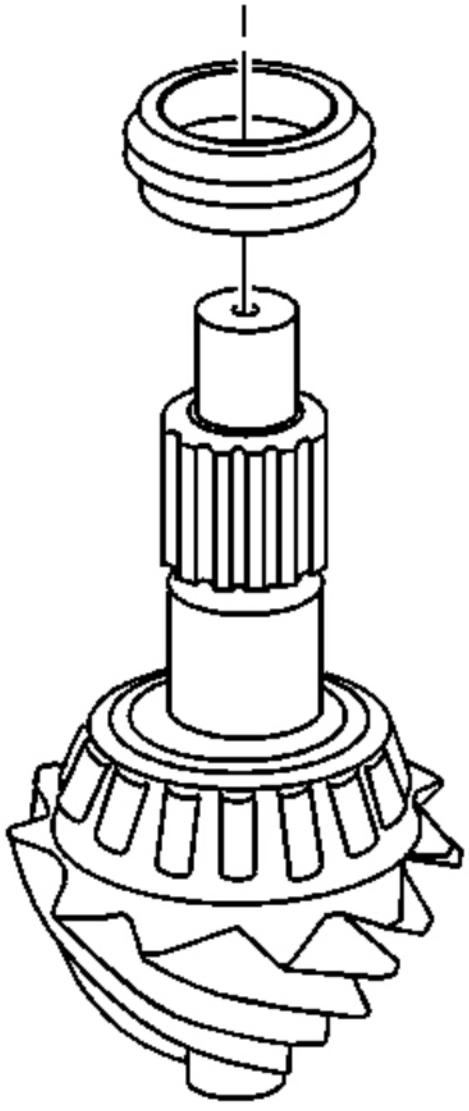


Fig. 130: View Of Collapsible Spacer
Courtesy of GENERAL MOTORS CORP.

21. Remove the inner pinion bearing from the pinion using the **J 22912-01** and a hydraulic press.

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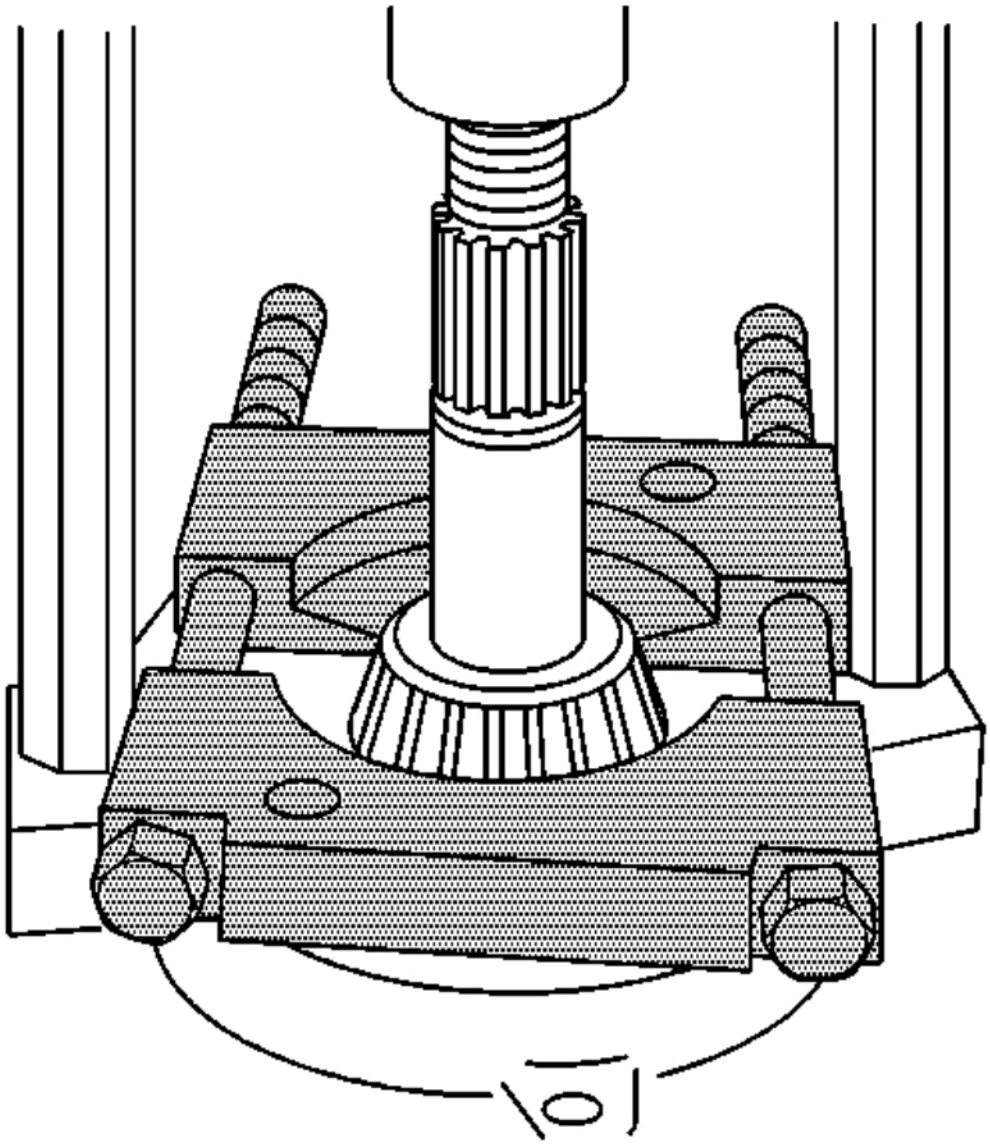


Fig. 131: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

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.

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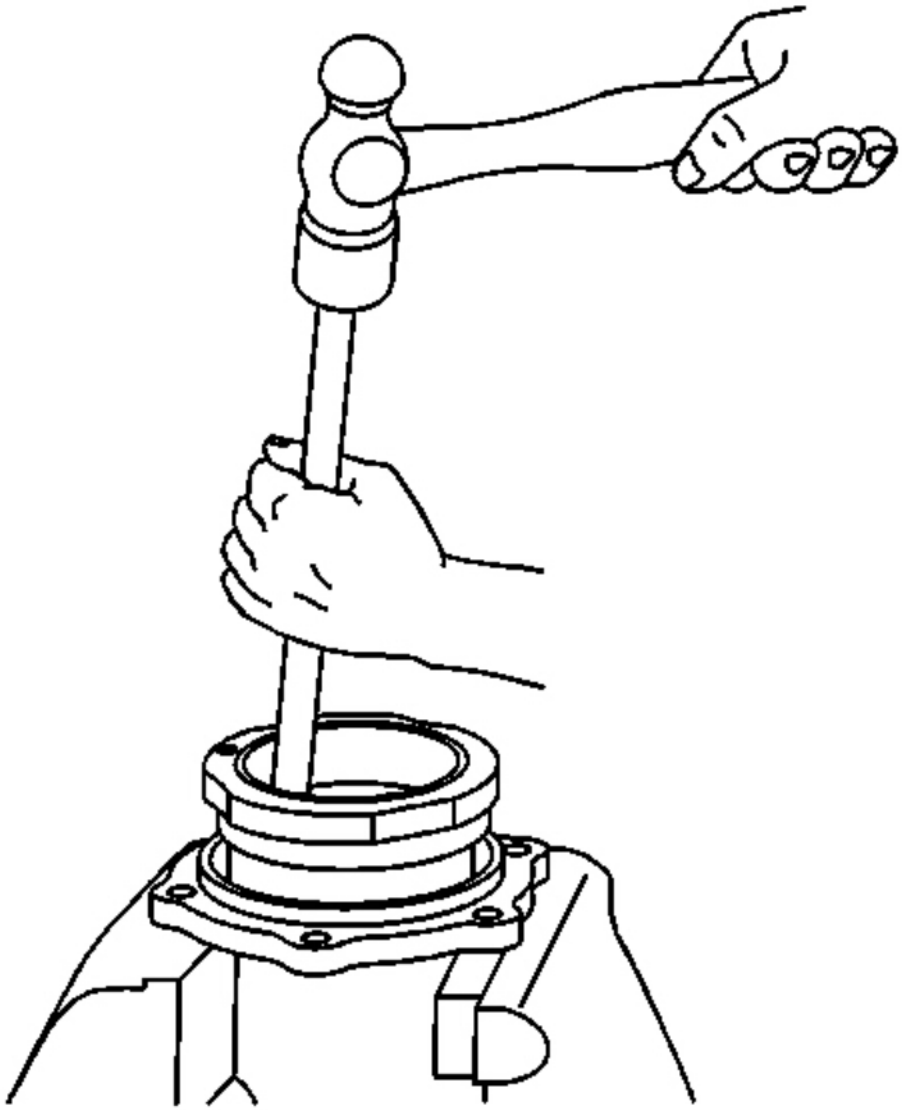


Fig. 132: Removing Outer Pinion Bearing Cup Using Hammer & Brass Drift
Courtesy of GENERAL MOTORS CORP.

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.

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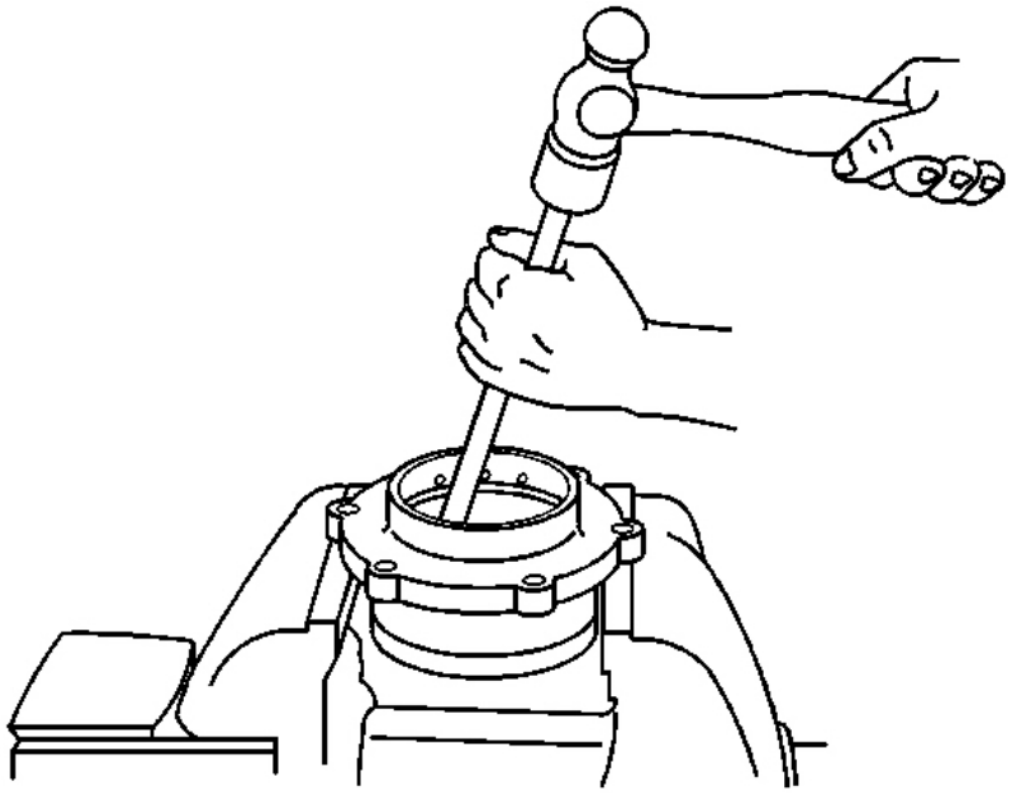


Fig. 133: Removing Inner Pinion Bearing Cup Using Hammer & Brass Drift
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

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 and Equipment**.

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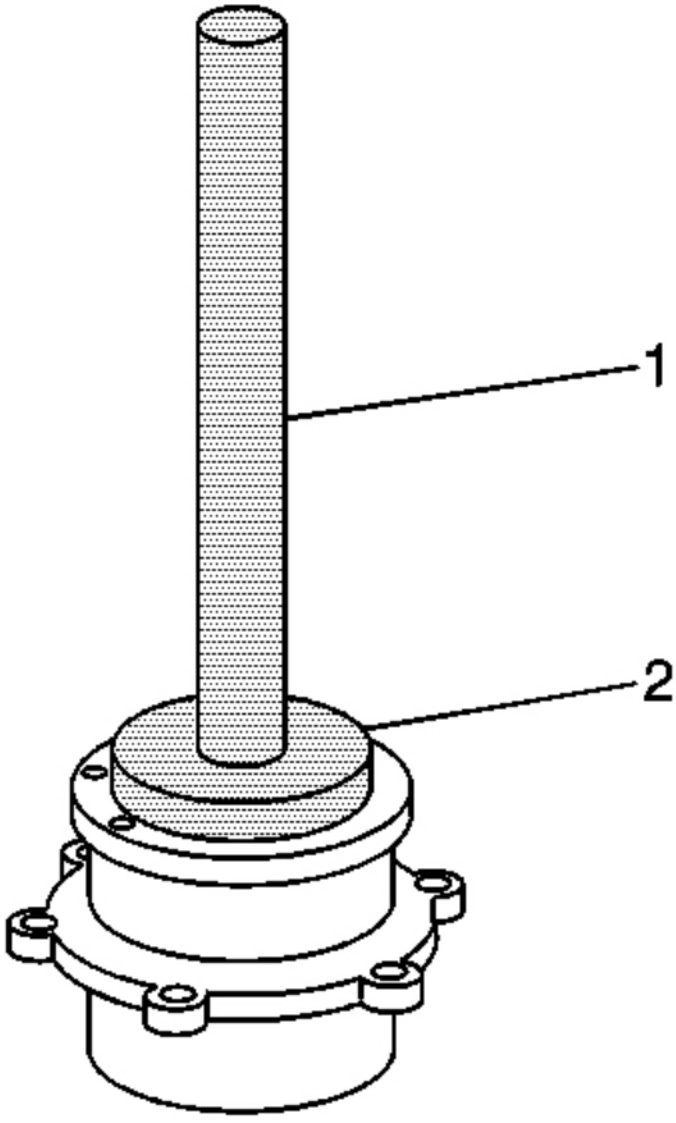


Fig. 134: Installing Inner Pinion Bearing Cup Using J 37624 & J 8092
Courtesy of GENERAL MOTORS CORP.

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

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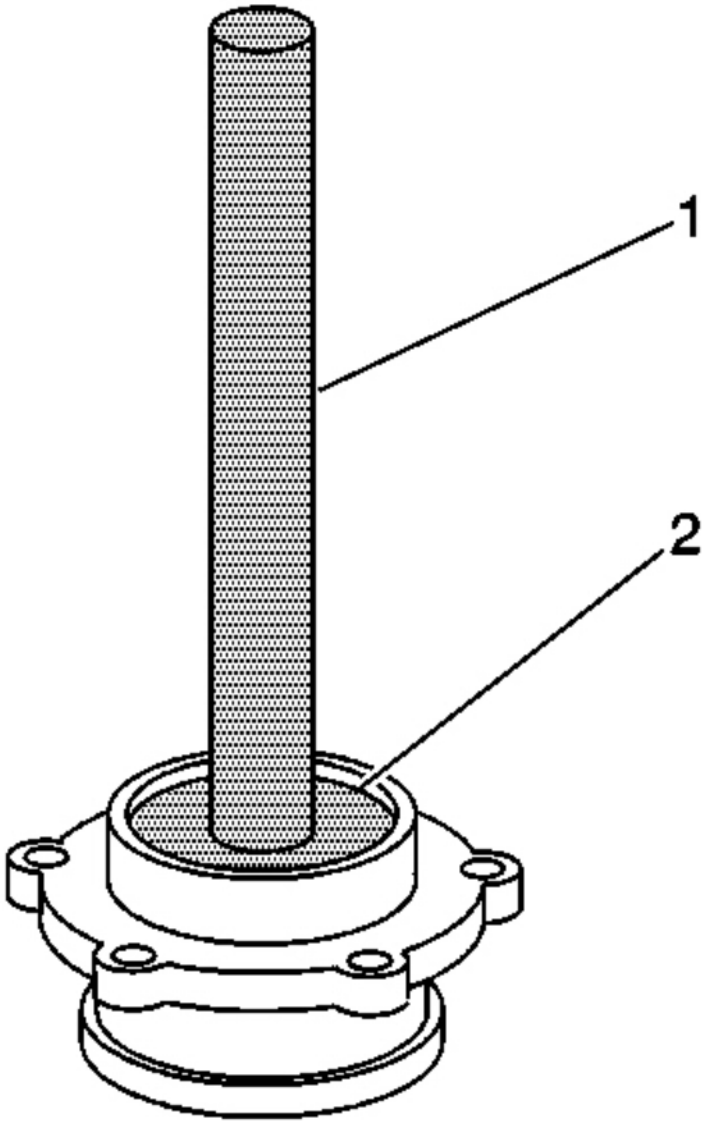


Fig. 135: Installing Outer Pinion Bearing Cup Using J 8608 & J 8092
Courtesy of GENERAL MOTORS CORP.

3. Install the inner pinion bearing using the **J 24433** .

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

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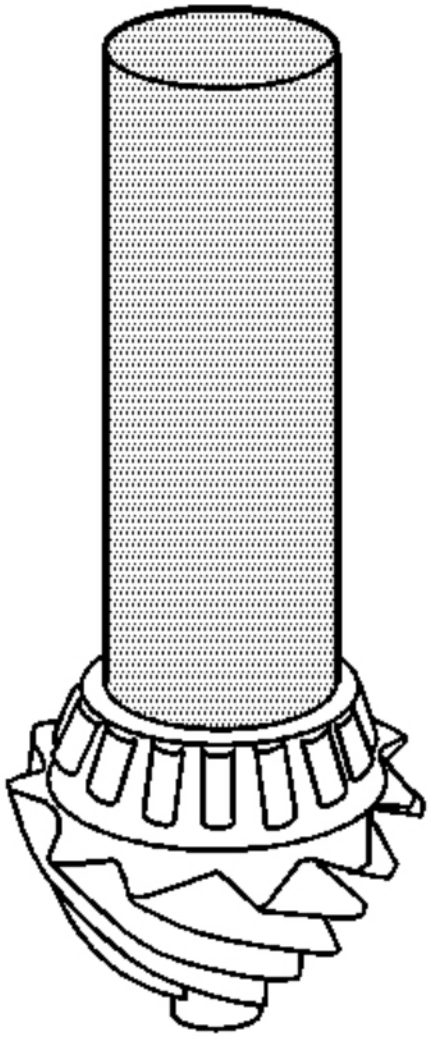


Fig. 136: Installing Inner Pinion Bearing Using J 24433
Courtesy of GENERAL MOTORS CORP.

4. Install a new collapsible spacer.
5. Lubricate the pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
6. Install the pinion into the pinion gear bearing retainer.
7. Install the outer pinion bearing onto the pinion.

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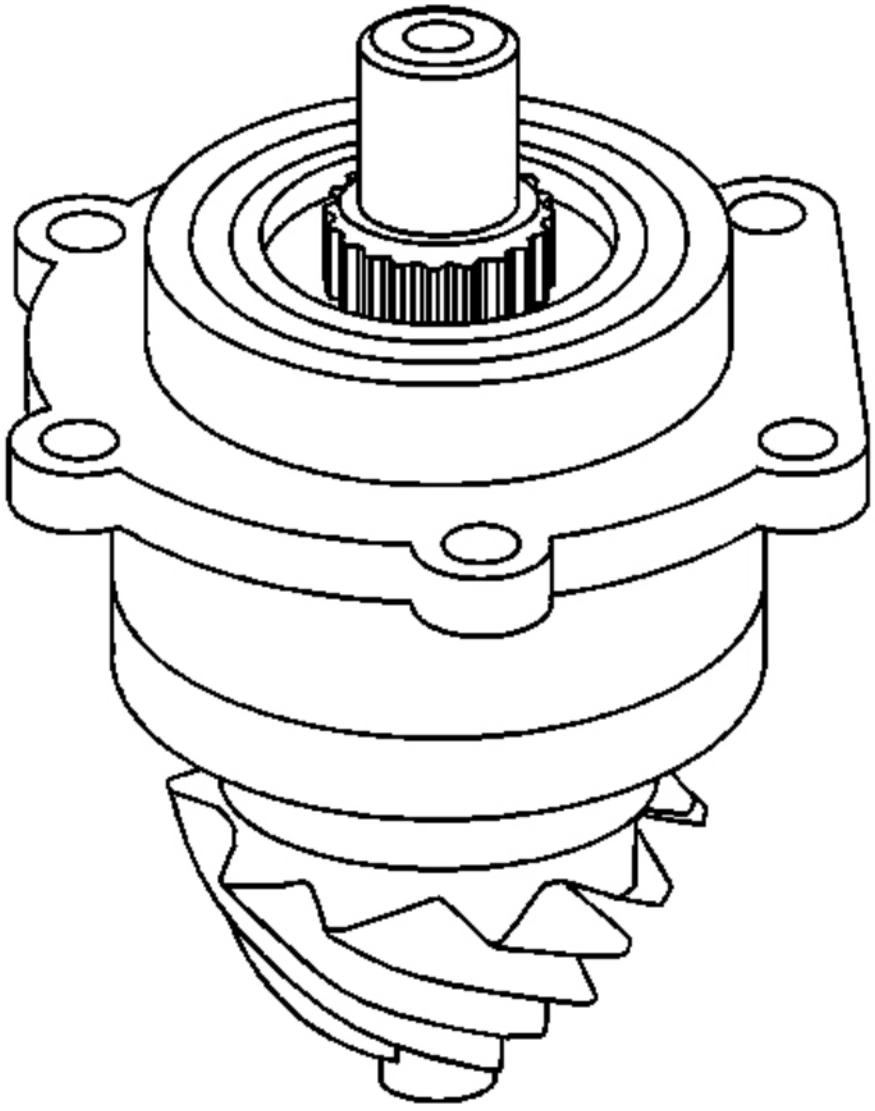


Fig. 137: View Of Pinion Into Pinion Gear Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

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

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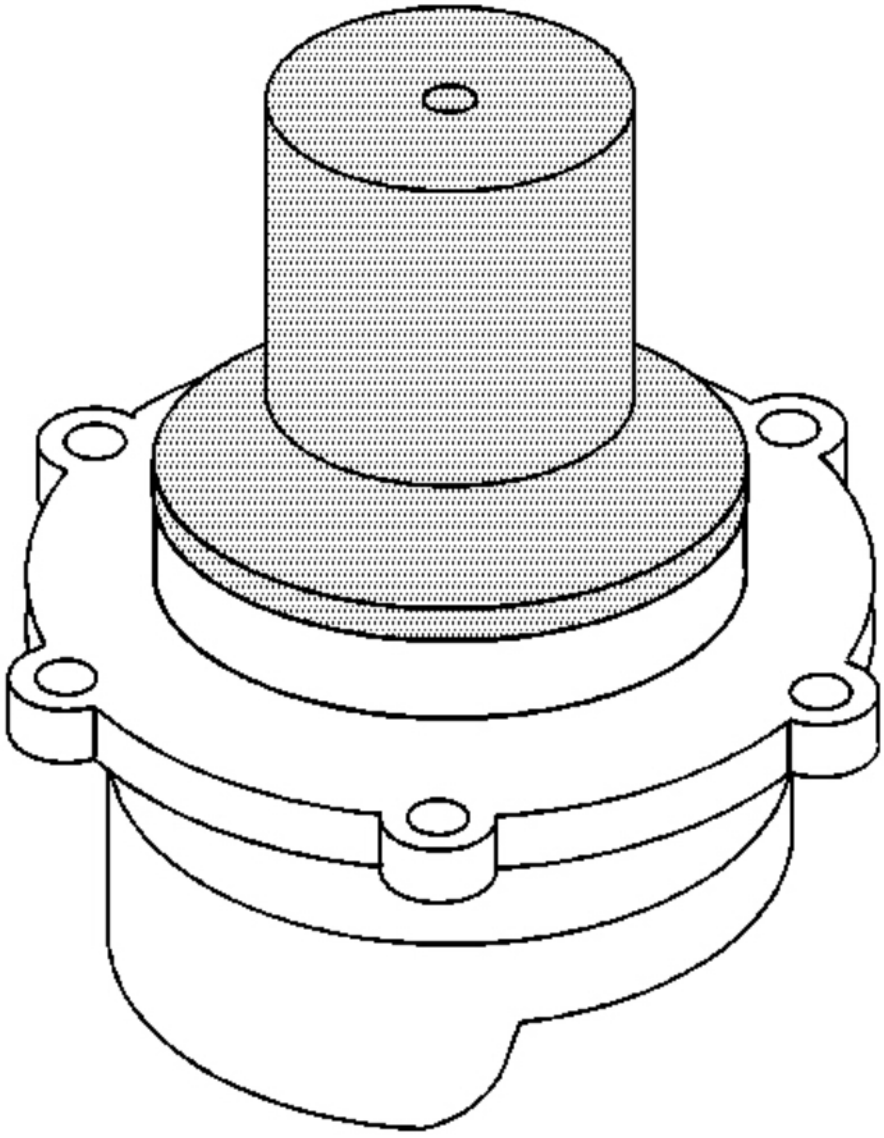


Fig. 138: Installing Pinion Oil Seal Using J 44414
Courtesy of GENERAL MOTORS CORP.

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.

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Align the marks made during removal.

NOTE: Refer to Pinion Flange/Yoke Installation Notice in Cautions and Notices.

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

NOTE: Refer to Fastener Notice in Cautions and Notices.

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.

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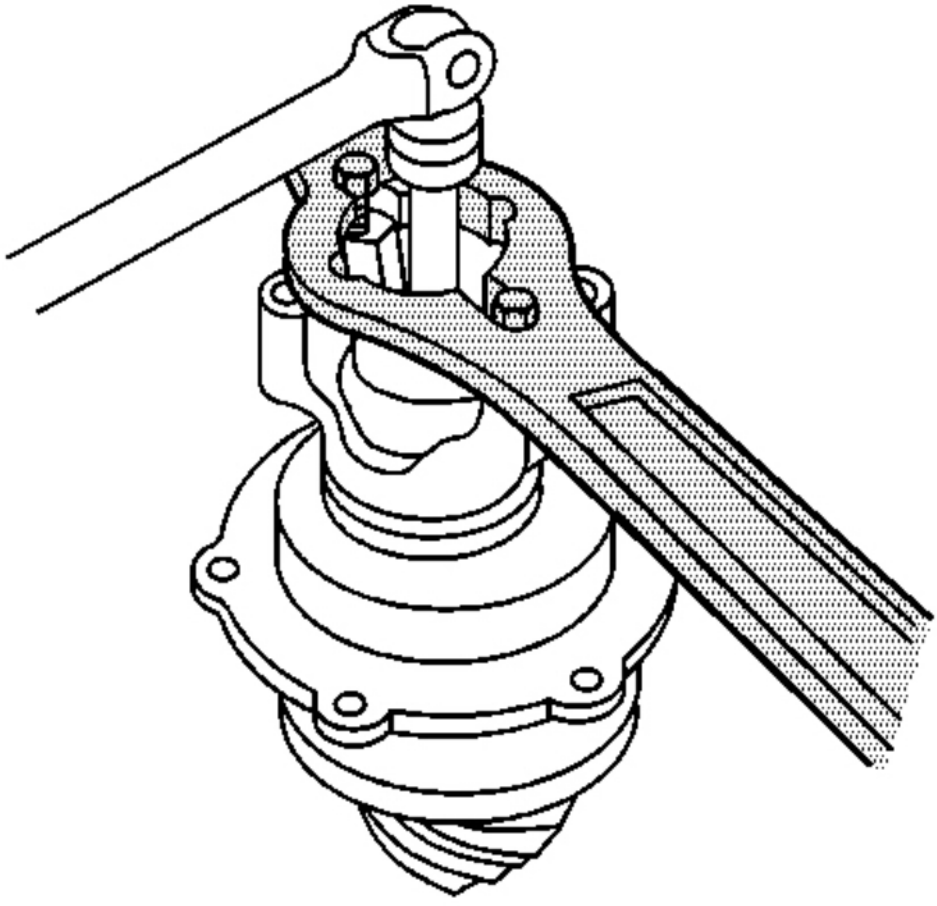


Fig. 139: Installing J 8614-01 Onto Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

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.

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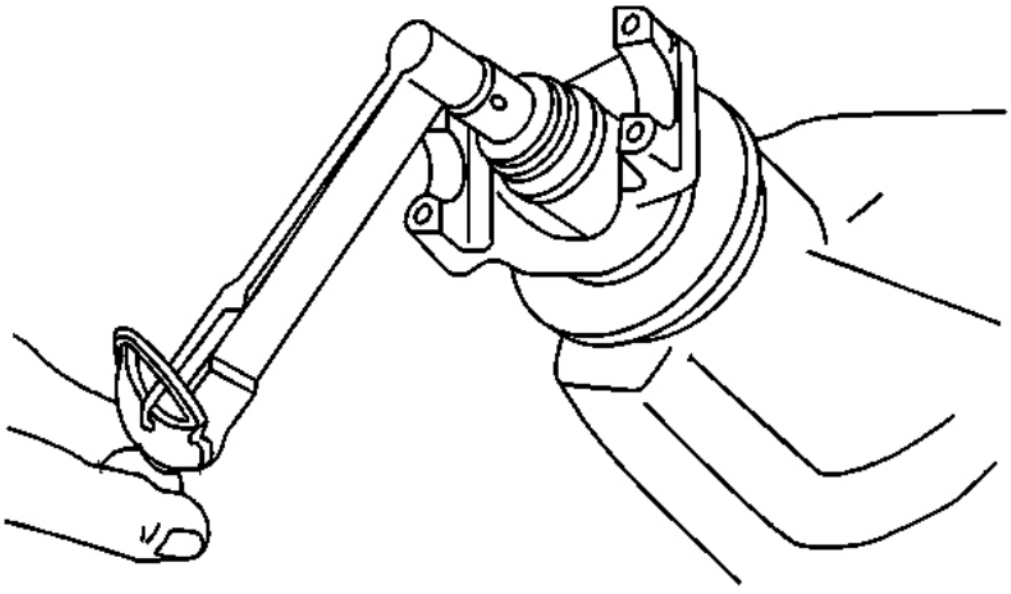


Fig. 140: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

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 (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.
18. Apply sealant, GM P/N 1052942 (Canadian P/N 10953466) or equivalent, to the 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 the 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).

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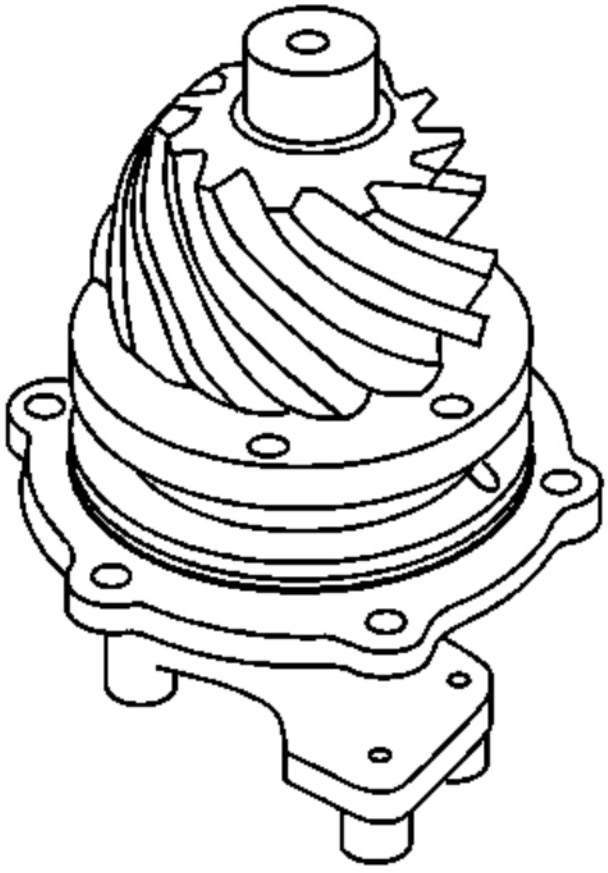


Fig. 141: View Of Pinion Gear Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

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 pinion and the ring gear should be between 3.9-6.2 N.m (30-55 lb in) for new bearings or 2.8-5.6 N.m (25-50 lb in) for used bearings.

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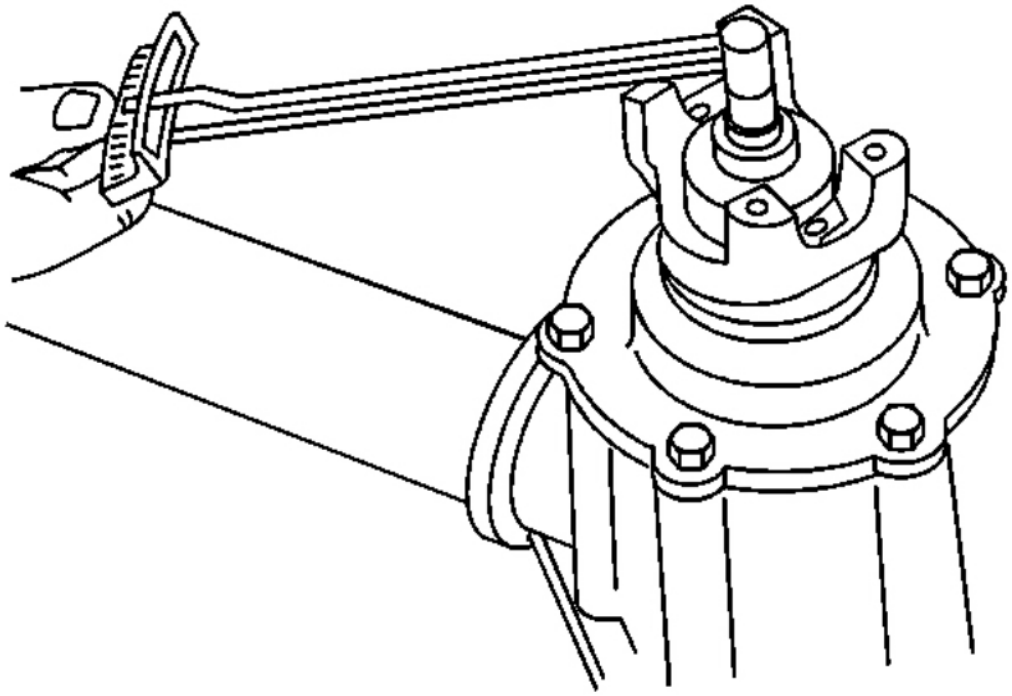


Fig. 142: Measuring Rotating Torque Of Pinion & Ring Gear
Courtesy of GENERAL MOTORS CORP.

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.
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).

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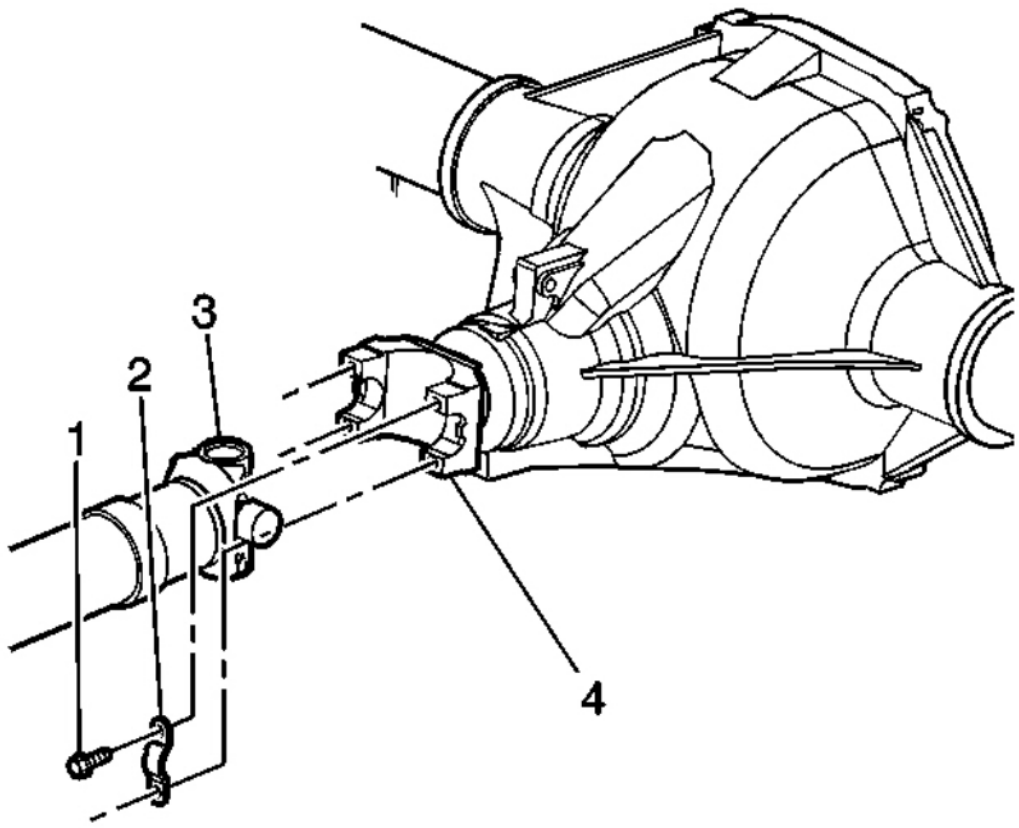


Fig. 143: Identifying Driveshaft Pinion, Yoke Retainers & Bolts
Courtesy of GENERAL MOTORS CORP.

27. Install the axle shafts. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
28. Fill the axle with axle lubricant. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
29. Lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT (8.6 INCH, 9.5 INCH AXLE)

Tools Required

J 22536 Pinion Driver. See **Special Tools and Equipment**.

Removal Procedure

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1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 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 (9.75 Inch Axle)**.
4. Install the **J 22536** as shown.

   Ensure that the **J 22536** is firmly seated on the pinion.

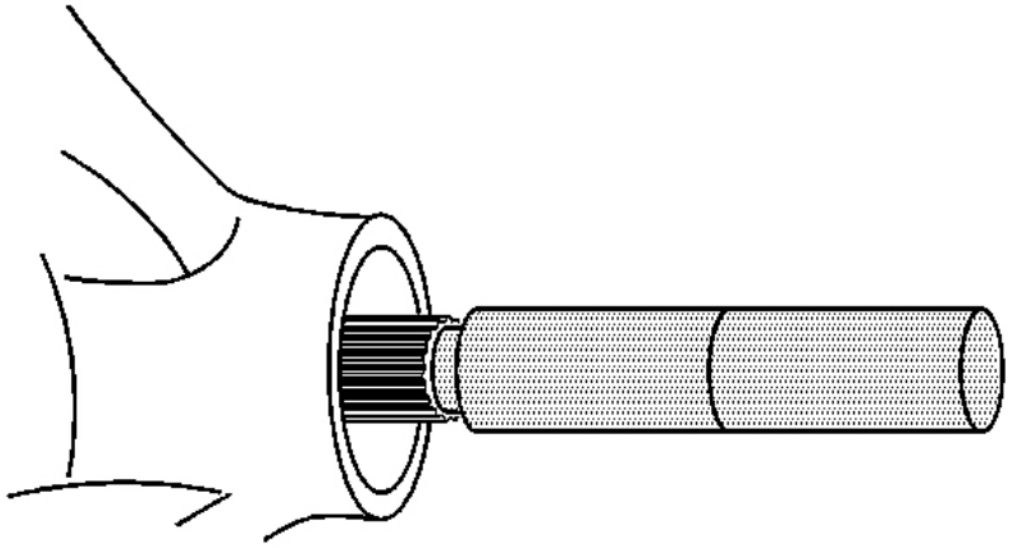


Fig. 144: Installing J 22536 Or J 44421 On Pinion
Courtesy of GENERAL MOTORS CORP.

5. Drive the pinion out using the **J 22536** and a hammer.

   Strike the **J 22536** slowly. Do not let the pinion fall out of the rear axle housing.

6. Remove the collapsible spacer from the pinion. Discard the spacer.

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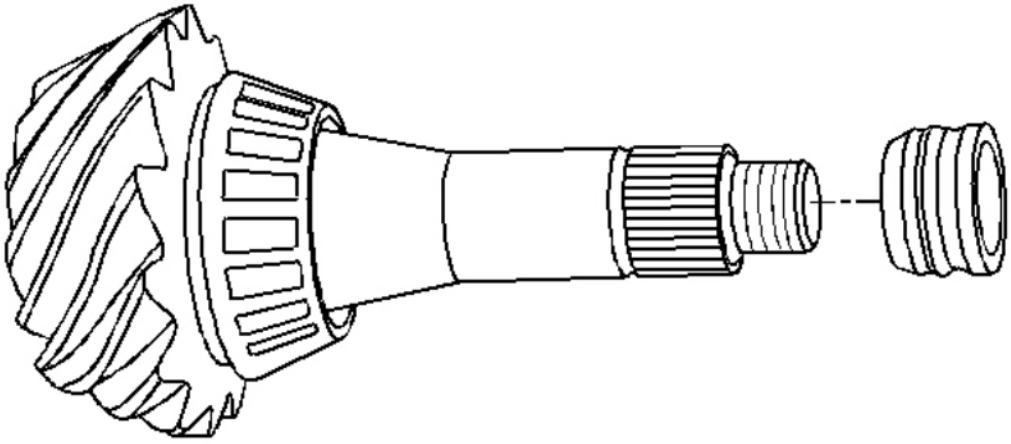


Fig. 145: View Of Collapsible Spacer & Pinion
Courtesy of GENERAL MOTORS CORP.

7. Remove the pinion bearings and the cups. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.

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

8. Remove the ring gear bolts. Discard the bolts.

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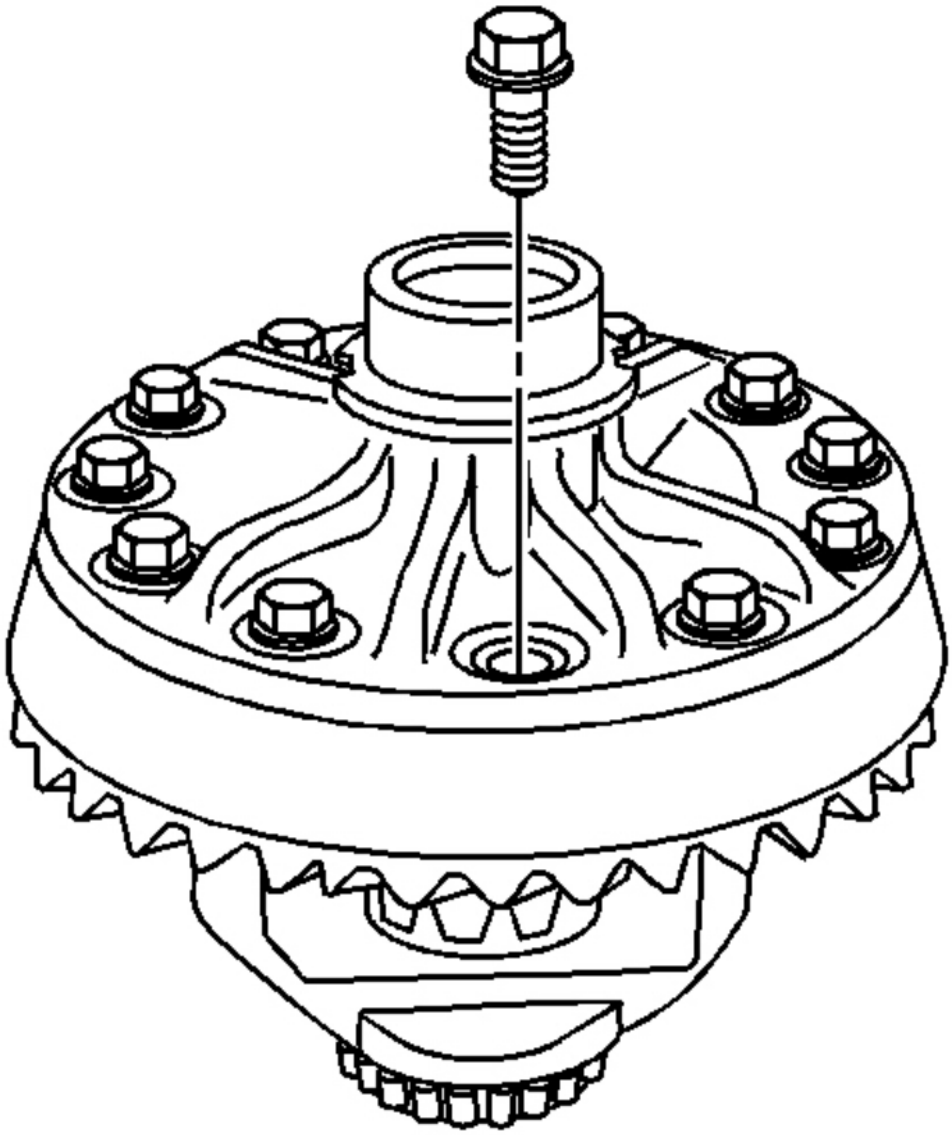


Fig. 146: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Ring Gear Removal Notice in Cautions and Notices.

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

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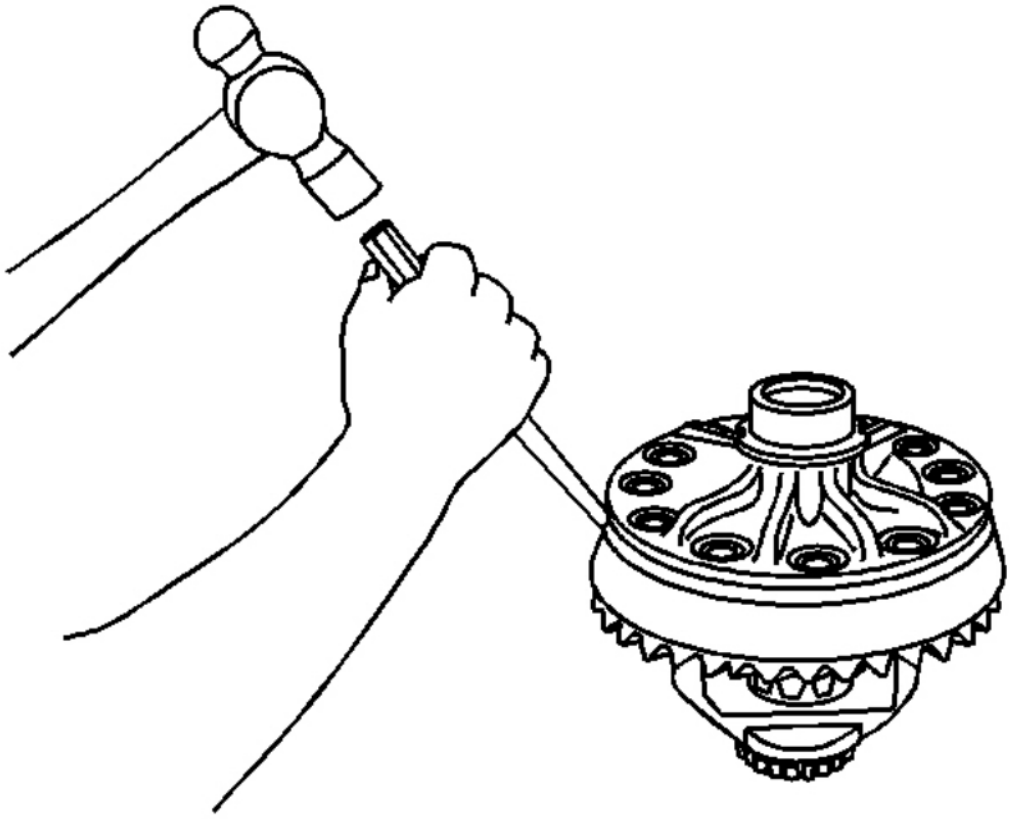


Fig. 147: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

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.

1. Install the ring gear to the differential case.

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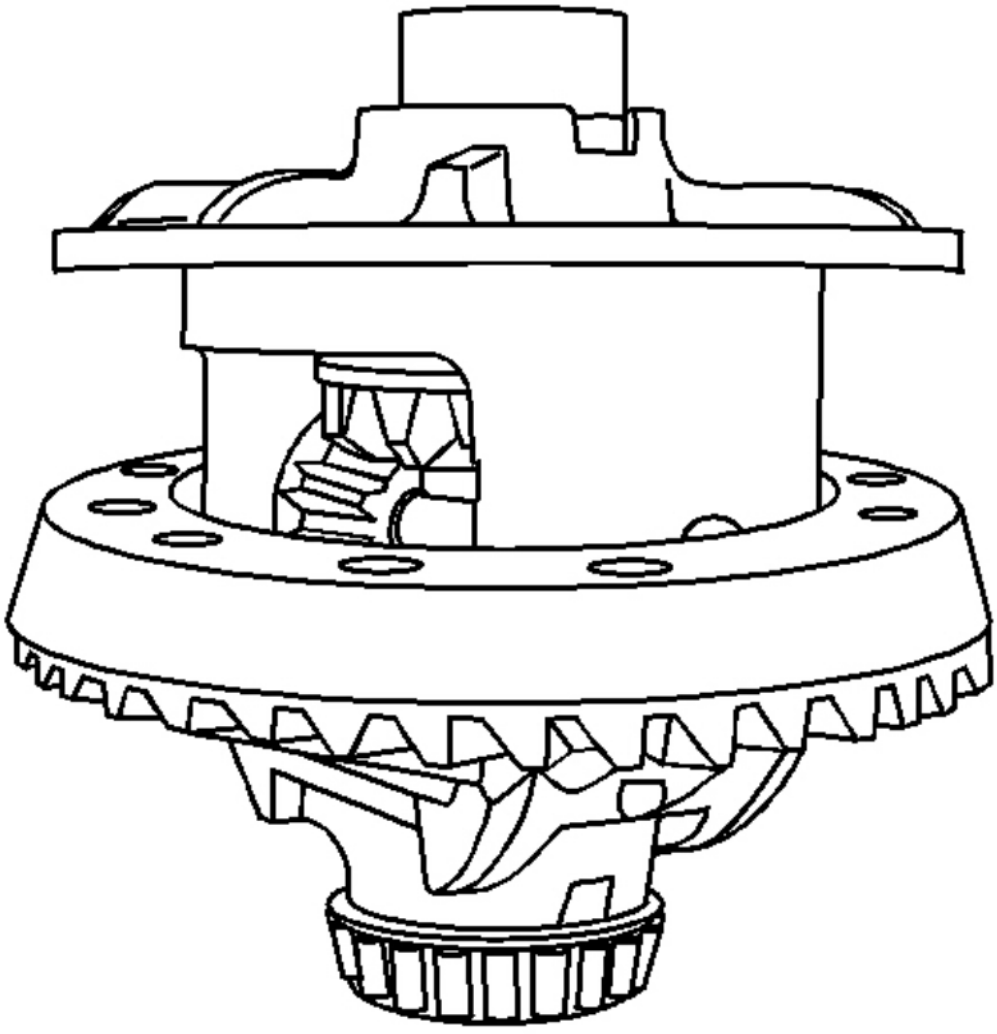


Fig. 148: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The ring gear bolts have left-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.

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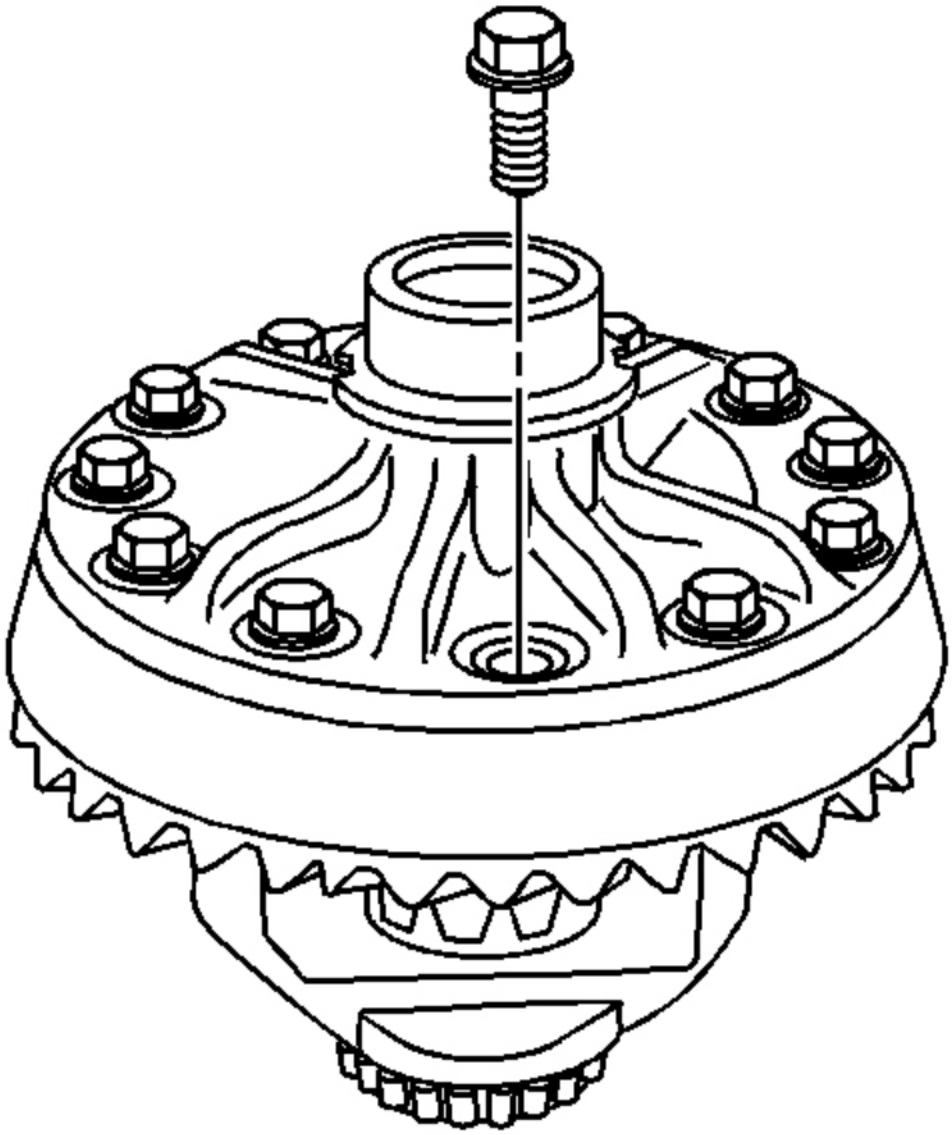


Fig. 149: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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

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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 inch axle, tighten the ring gear bolts in sequence to 140 N.m (103 lb ft).

4. Install the pinion bearing cups. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 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 (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.
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 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 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** in Maintenance and Lubrication.
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 (9.75 Inch Axle)**.
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 (9.75 Inch Axle)**.
14. Install the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
15. Fill the axle with lubricant. Use the proper fluid. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
16. Lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT (9.75 INCH AXLE)

Tools Required

J 22536 Pinion Driver. See **Special Tools and Equipment**.

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
3. Remove the drive pinion yoke and the 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**

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Replacement (9.75 Inch Axle).

4. Remove the thrust washer.

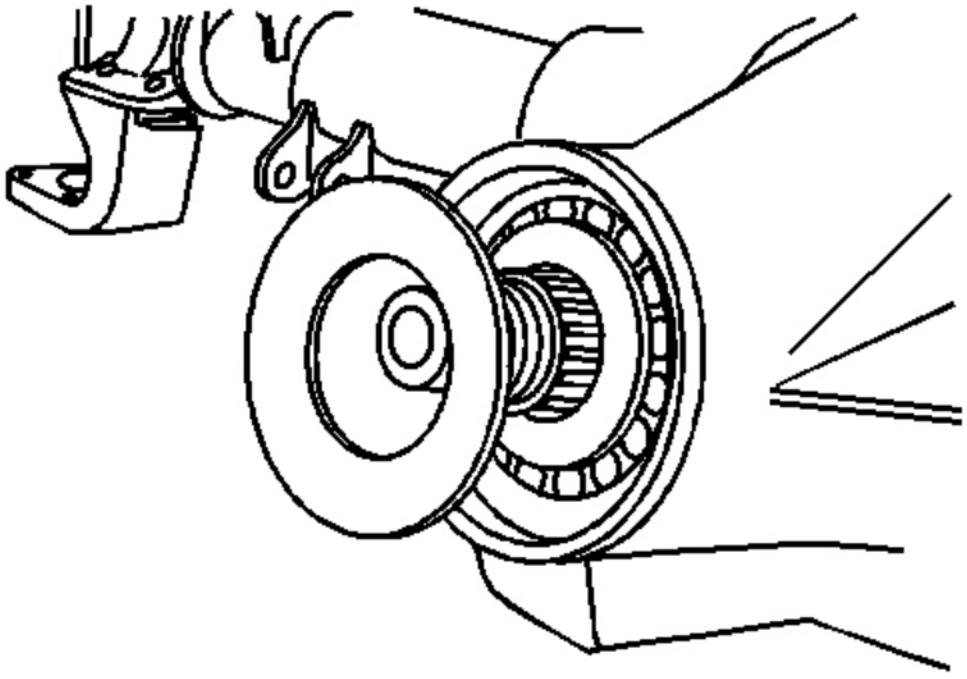


Fig. 150: View Of Thrust Washer (9.75 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

5. Install the **J 22536** as shown.

   Ensure that the **J 22536** is firmly seated on the pinion.

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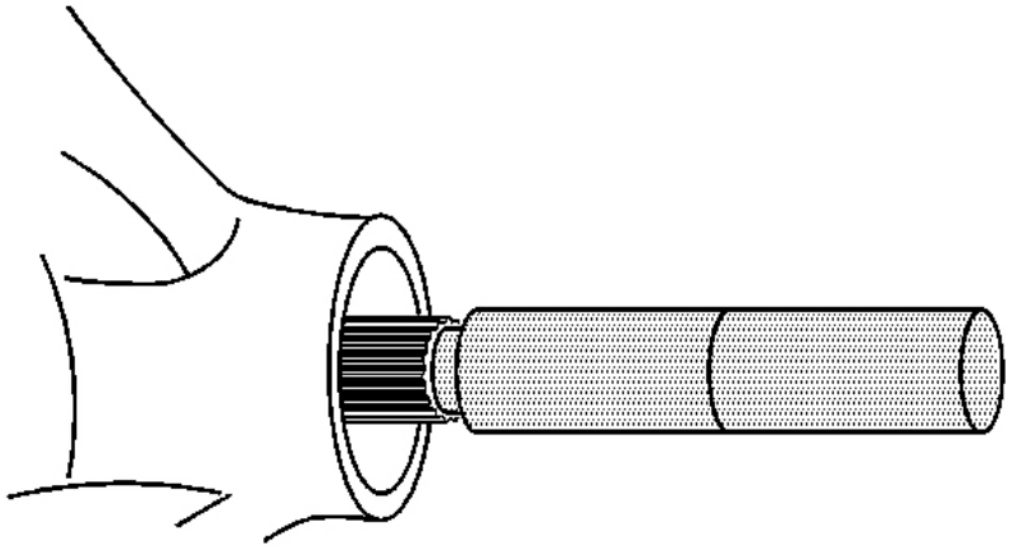


Fig. 151: Installing J 22536 Or J 44421 On Pinion
Courtesy of GENERAL MOTORS CORP.

6. Drive the pinion out using the **J 22536** and a hammer.

   Strike the **J 22536** slowly. Do not let the pinion fall out of the rear axle housing.

7. Remove the pinion preload shims from the drive pinion and set aside.
8. Remove the inner pinion bearing and the pinion position shim. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.

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

9. Remove the ring gear bolts. Discard the bolts.

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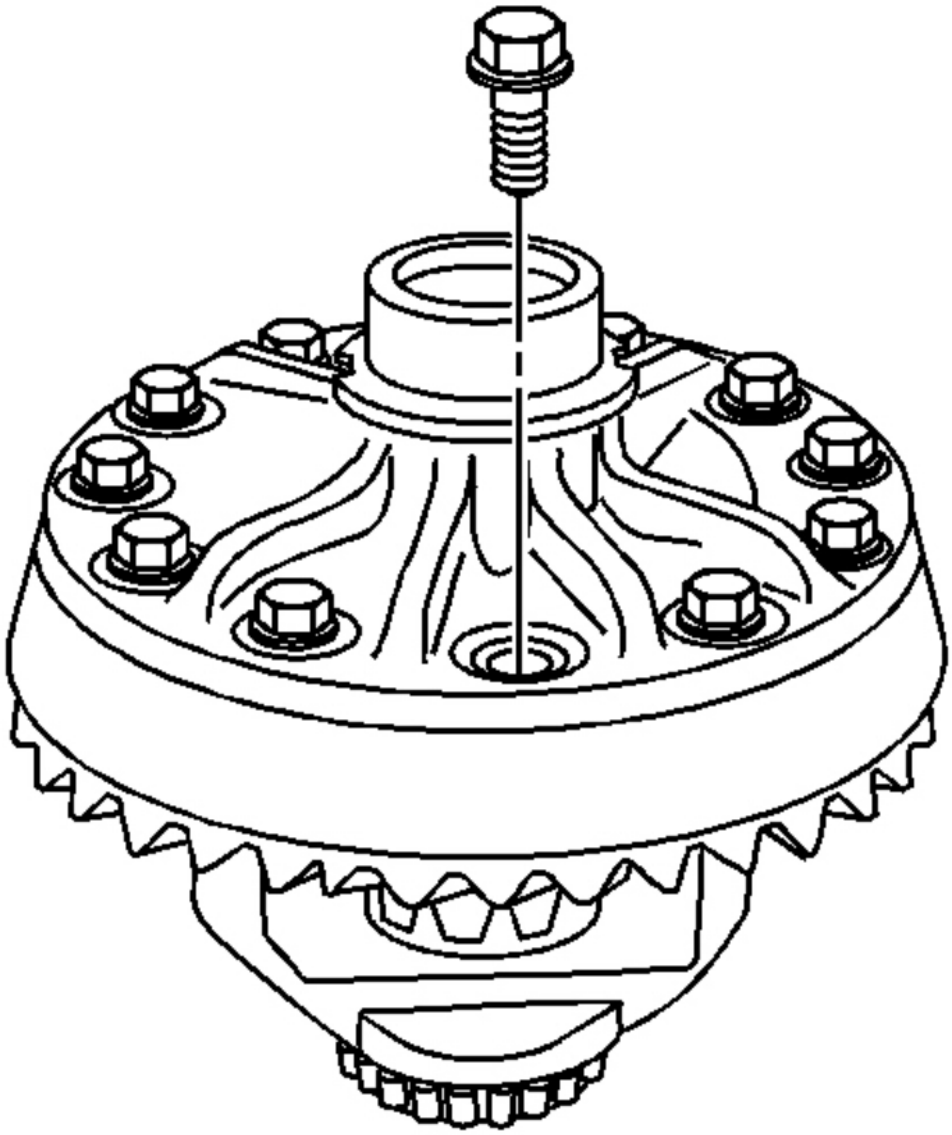


Fig. 152: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Ring Gear Removal Notice in Cautions and Notices.

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

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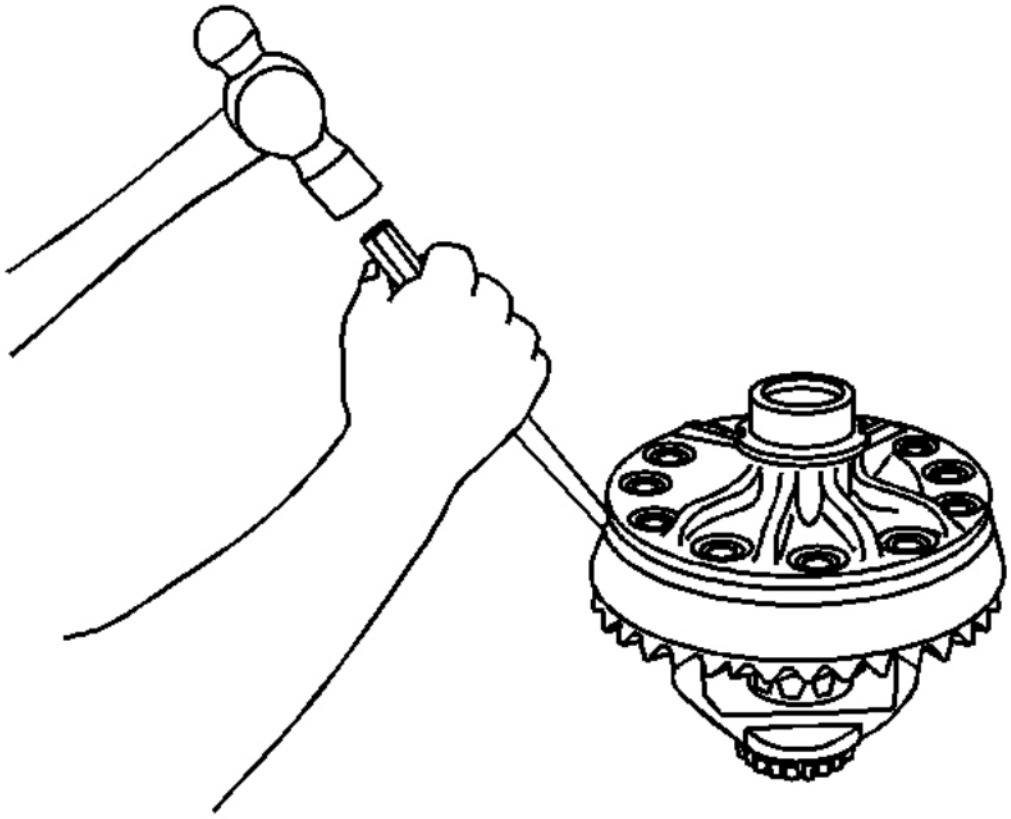


Fig. 153: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Determine the pinion position shim thickness and the pinion preload shim thickness for the drive pinion gear. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.

   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.

   Align the holes in the differential case to the bolts holes in the ring gear.

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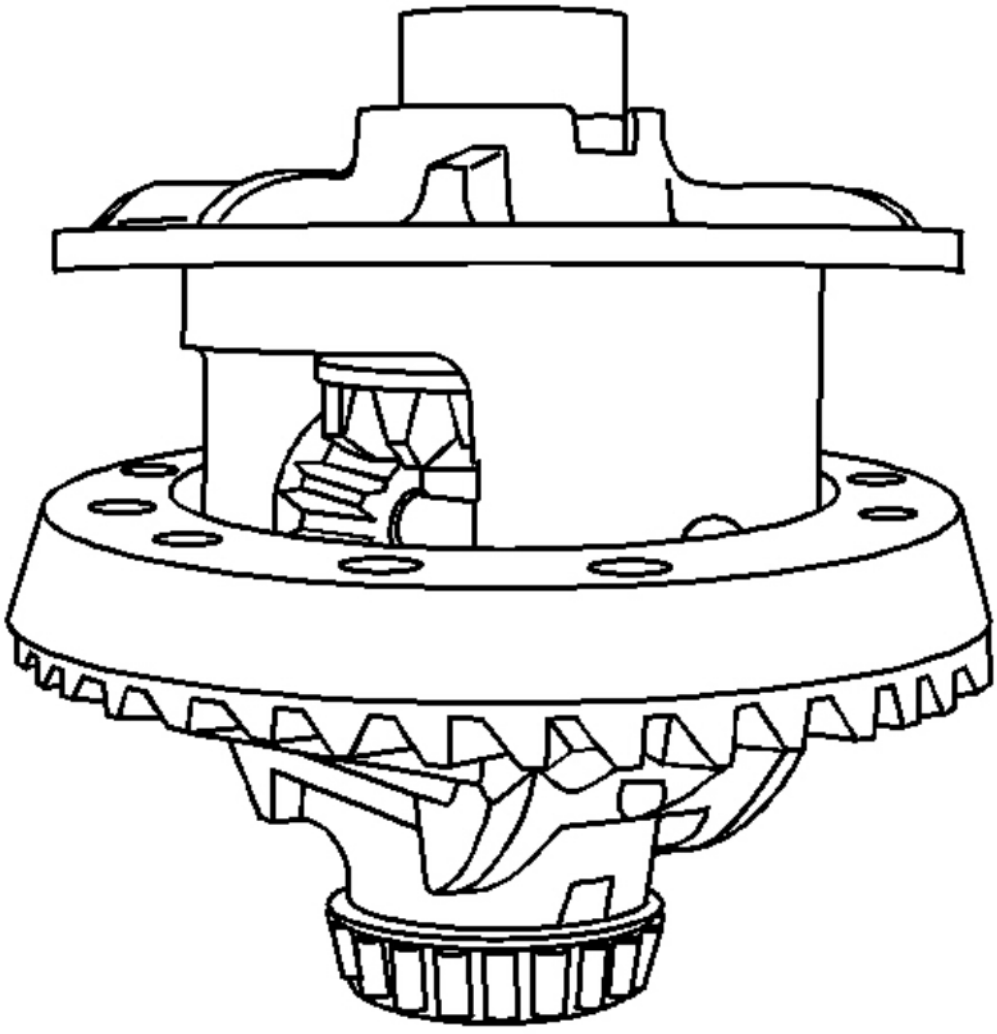


Fig. 154: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

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

3. Install the new ring gear bolts.

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

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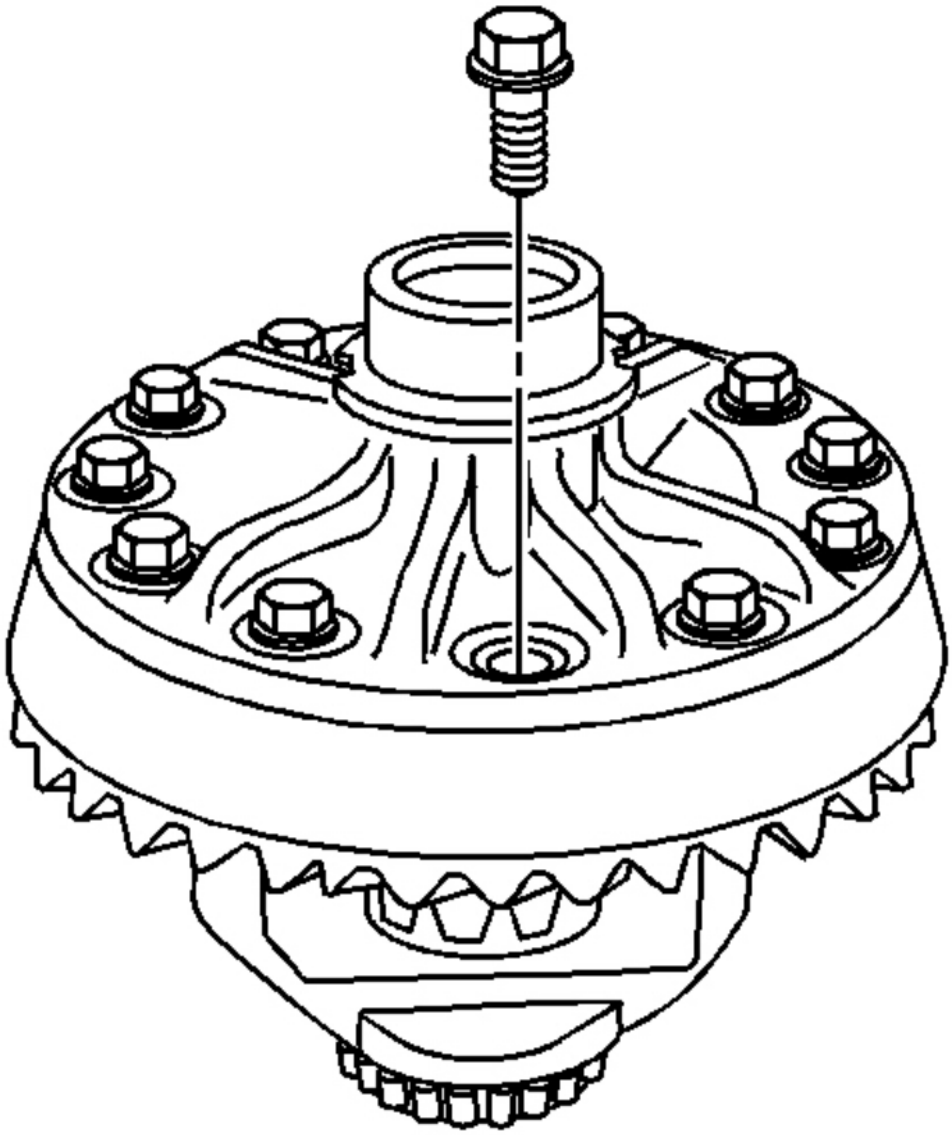


Fig. 155: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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.

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Tighten: Tighten the new ring gear bolts to 178 N.m (131 lb ft).

5. Install the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
6. Fill the axle with lubricant. Use the proper fluid. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
7. 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** in General Information.
2. Remove the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 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**.

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

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

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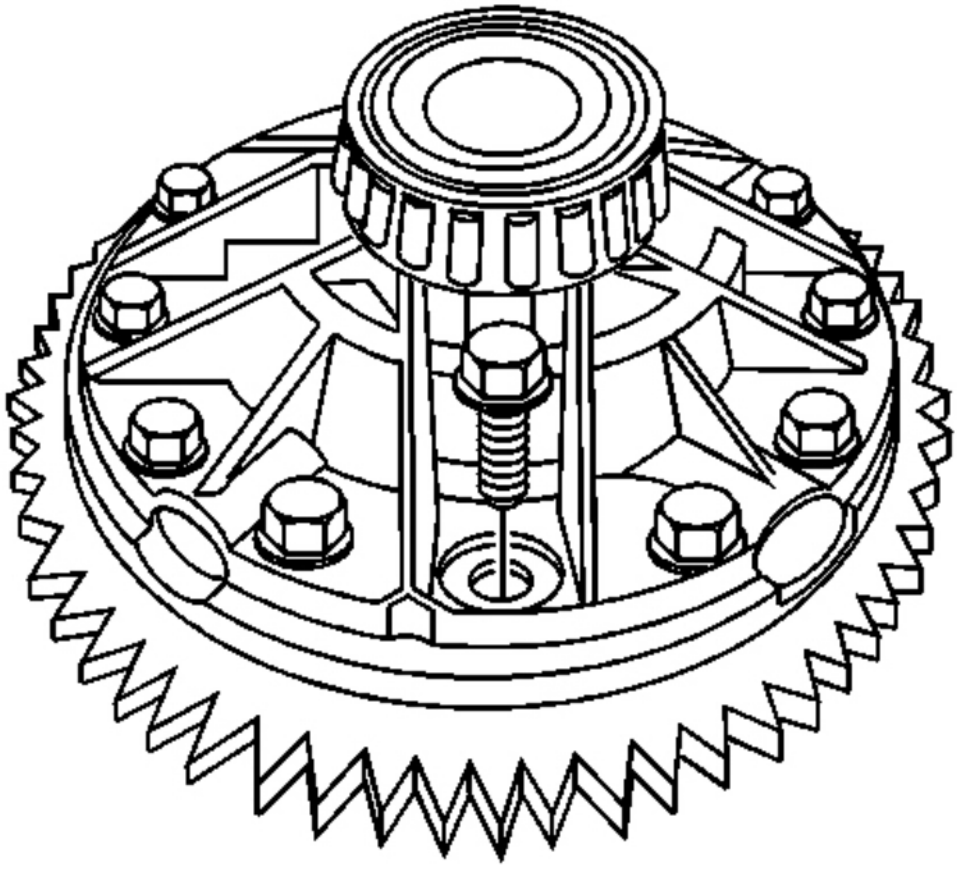


Fig. 156: View Of Ring Gear Bolts (10.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Ring Gear Removal Notice in Cautions and Notices.

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

Installation Procedure

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

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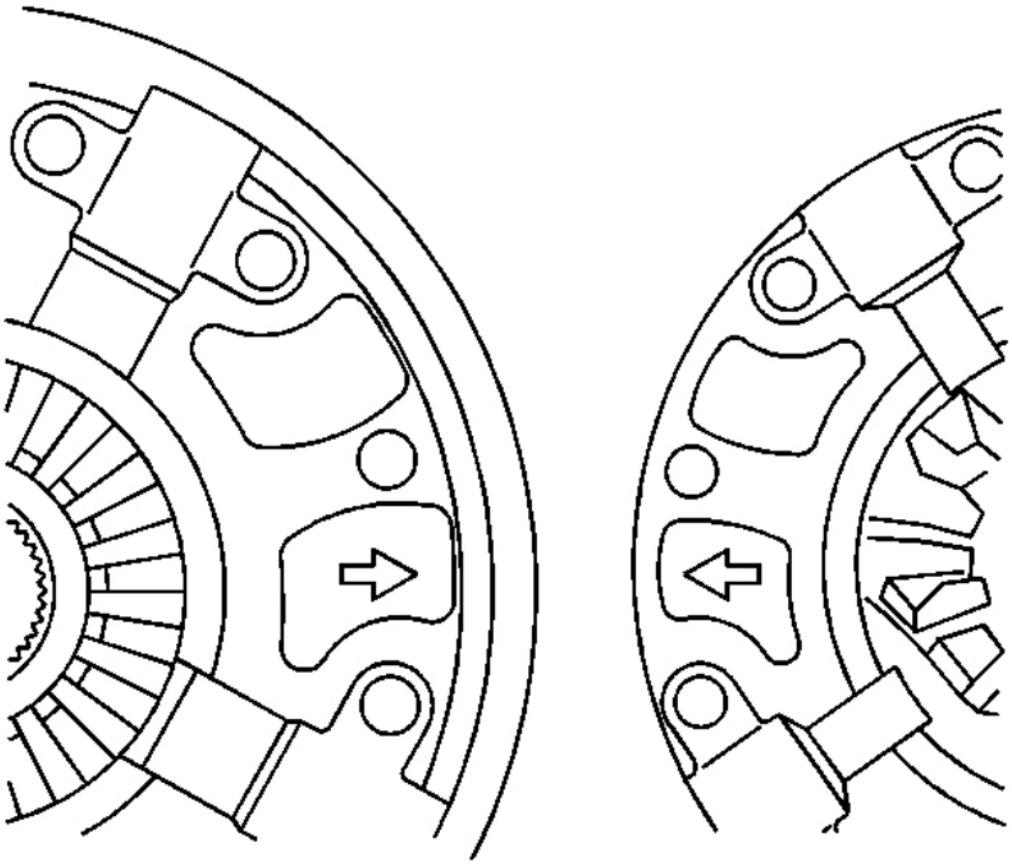


Fig. 157: Aligning Arrows On Differential Case
Courtesy of GENERAL MOTORS CORP.

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

2. Install the ring gear to the differential case.

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

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 in Cautions and Notices.

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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).

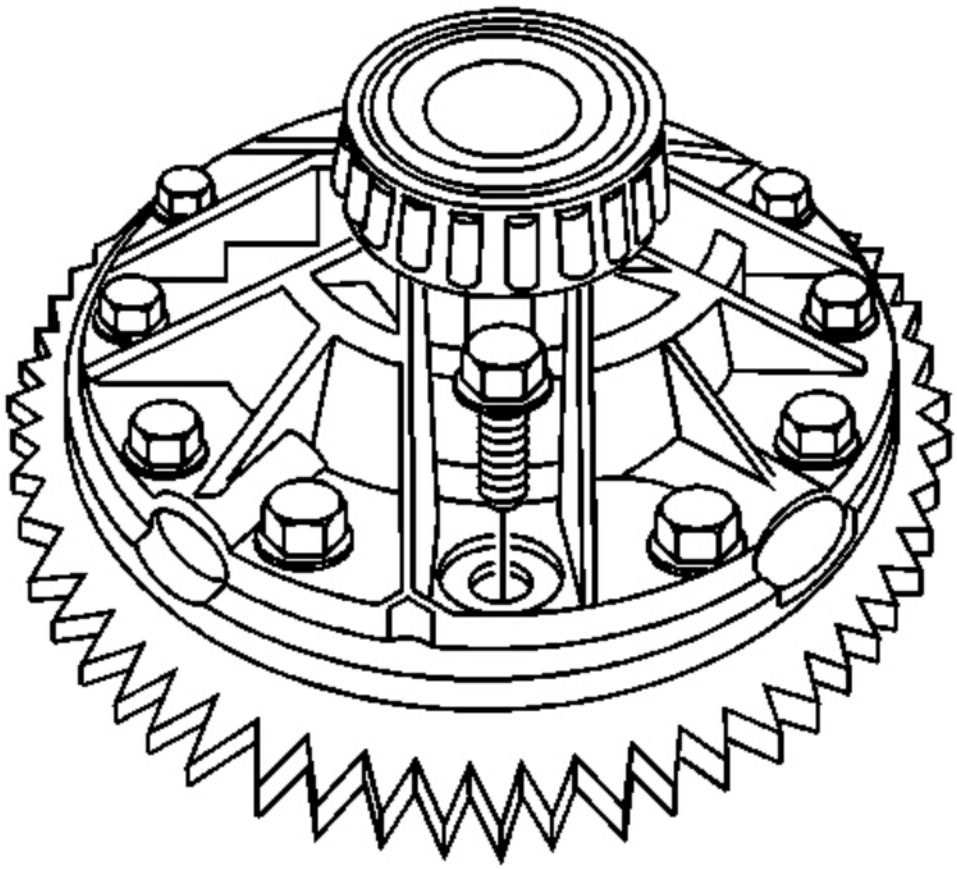


Fig. 158: View Of Ring Gear Bolts (10.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

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 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
8. Fill the axle with lubricant. Use the proper fluid. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant**

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Replacement - Rear Drive Axle (9.75 Inch Axle).

9. Lower the vehicle.

DRIVE PINION BEARINGS REPLACEMENT (8.6, 9.5 INCH AXLES)

Tools Required

- **J 7818** Inner Bearing Race Installer. See **Special Tools and Equipment**.
- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 8611-01** Rear Pinion Bearing Race Installer
- **J 8614-01** Flange and Pulley Holding Tool
- **J 22306** Rear Pinion Cup Bearing Installer
- **J 22912-01** Split Plate Bearing Puller
- **J 24433** Pinion Cone and Side Bearing Installer
- **J 36614** Inner Pinion Bearing Installer
- **J 45870** Pinion Bearing Cup Installer
- **J 45871** Pinion Bearing Remover

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
3. Remove the drive pinion from the axle. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
4. For the 8.6 inch axle, install the **J 45871** (1) around the pinion bearing and the **J 22912-01** (2) in the inverted position around the **J 45871** . See **Special Tools and Equipment**.

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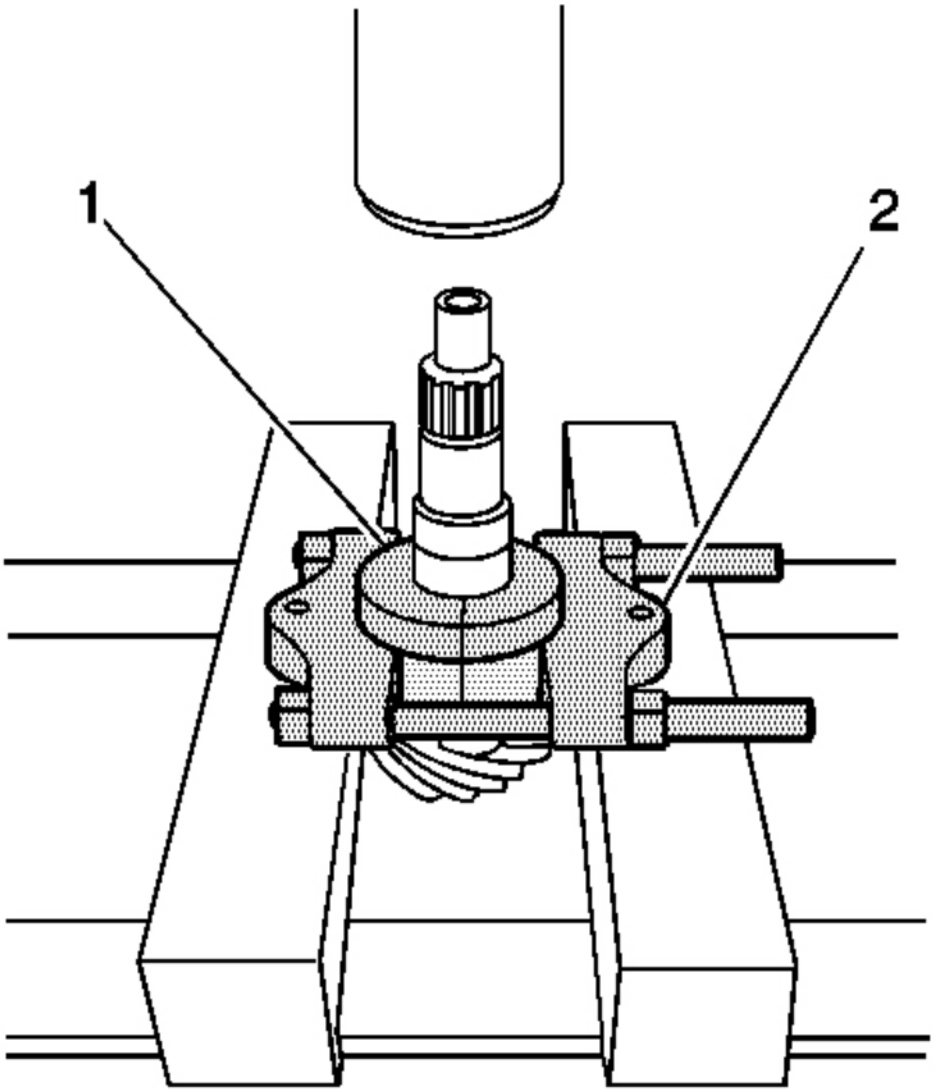


Fig. 159: Removing Pinion Bearing Using J 45871 & J 22912-01 (8.6 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

5. Press the bearing off of the pinion using the **J 45871** and the **J 22912-01** . See **Special Tools and Equipment**.
6. For the 9.5 inch and 11.5 inch axles, press the bearing off of the drive pinion using the **J 22912-01** .

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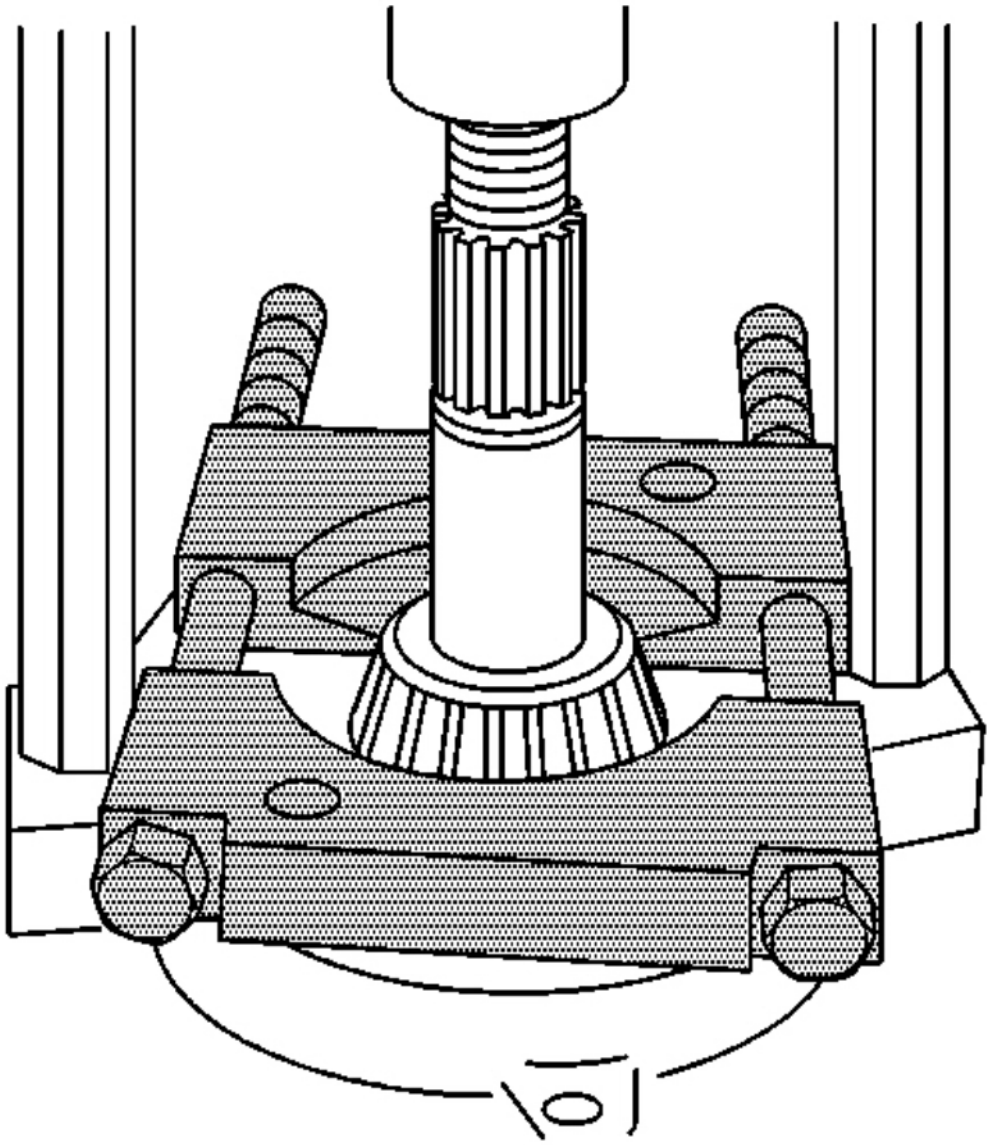


Fig. 160: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

7. Remove the shim.
8. 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.

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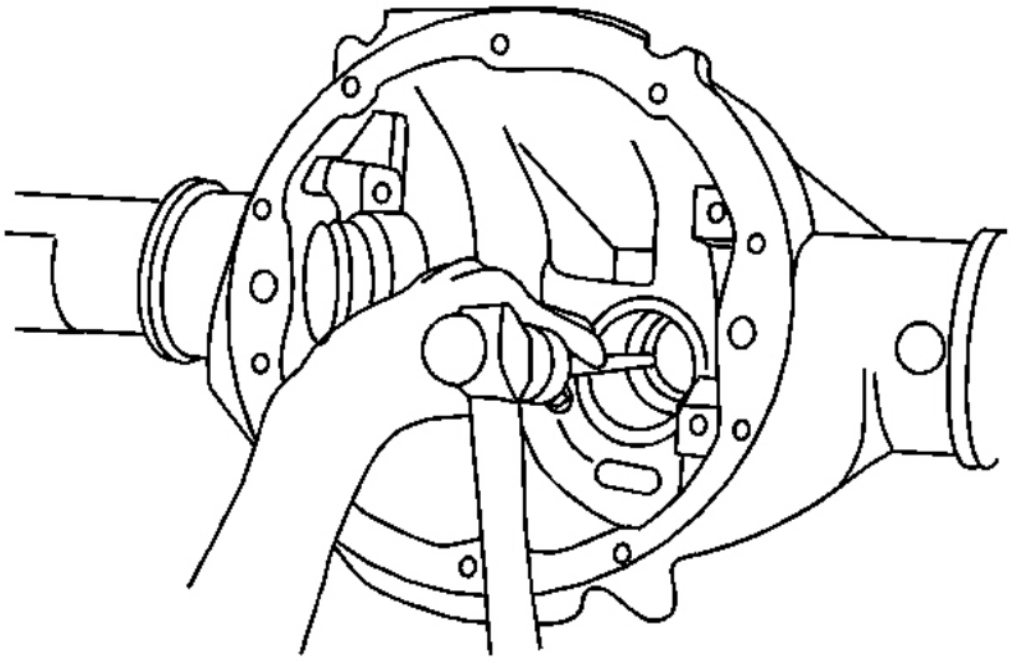


Fig. 161: Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

9. 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.

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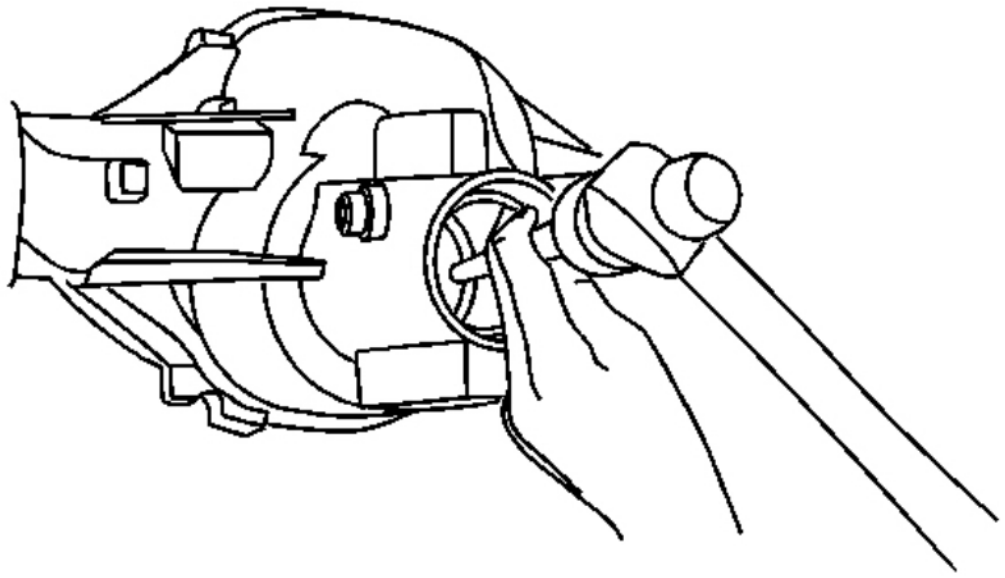


Fig. 162: Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the outer pinion bearing cup using the **J 8611-01** , 8.6 inch axle, or the **J 7818** , 9.5 inch axle (1), and the **J 8092** (2). See **Special Tools and Equipment**.

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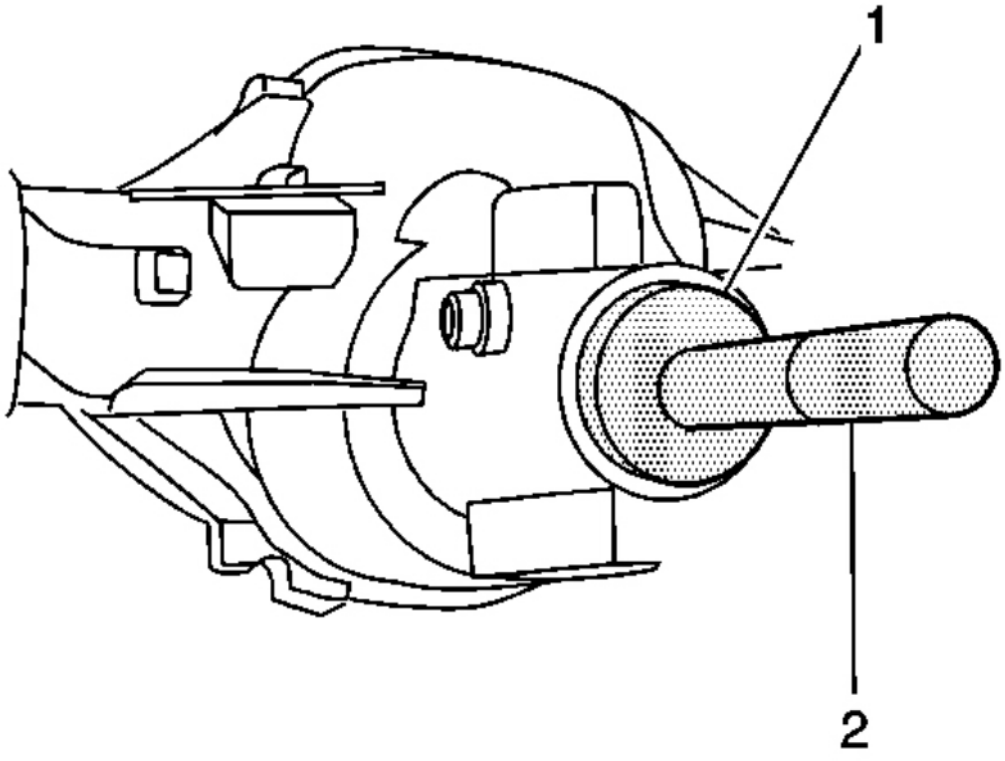


Fig. 163: Install The Outer Pinion Bearing Cup Using J 8611-01, J 7818 Or J 8608 & J 8092
Courtesy of GENERAL MOTORS CORP.

2. Install the inner pinion bearing cup using the **J 45870** , 8.6 inch axle, or the **J 22306** , 9.5 inch axle (2), and the **J 8092** (1). See **Special Tools and Equipment**.

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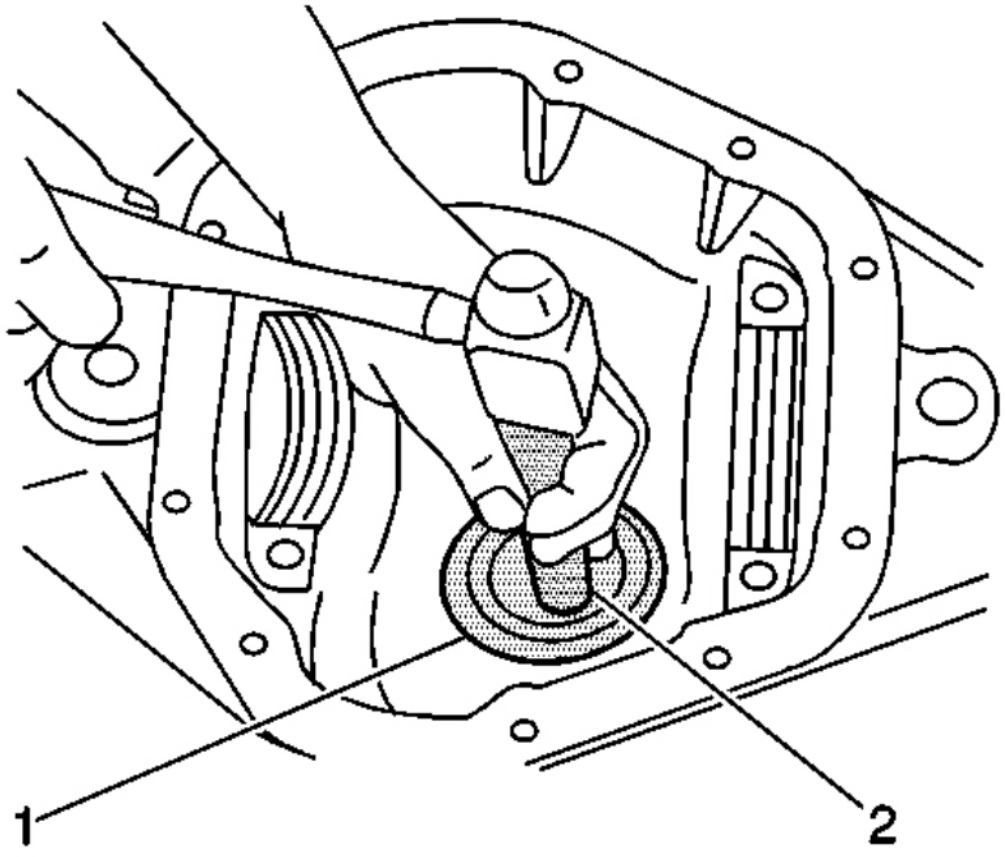


Fig. 164: Install The Inner Pinion Bearing Cup Using J 45900, J 22306 Or J 44417 & J 8092
Courtesy of GENERAL MOTORS CORP.

3. Determine the selective shim thickness for the drive pinion. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.
4. Install the selective shim between the inner pinion bearing and the shoulder on the gear.
5. Install the inner pinion bearing using the **J 24433** or the **J 36614** . See **Special Tools and Equipment**.

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

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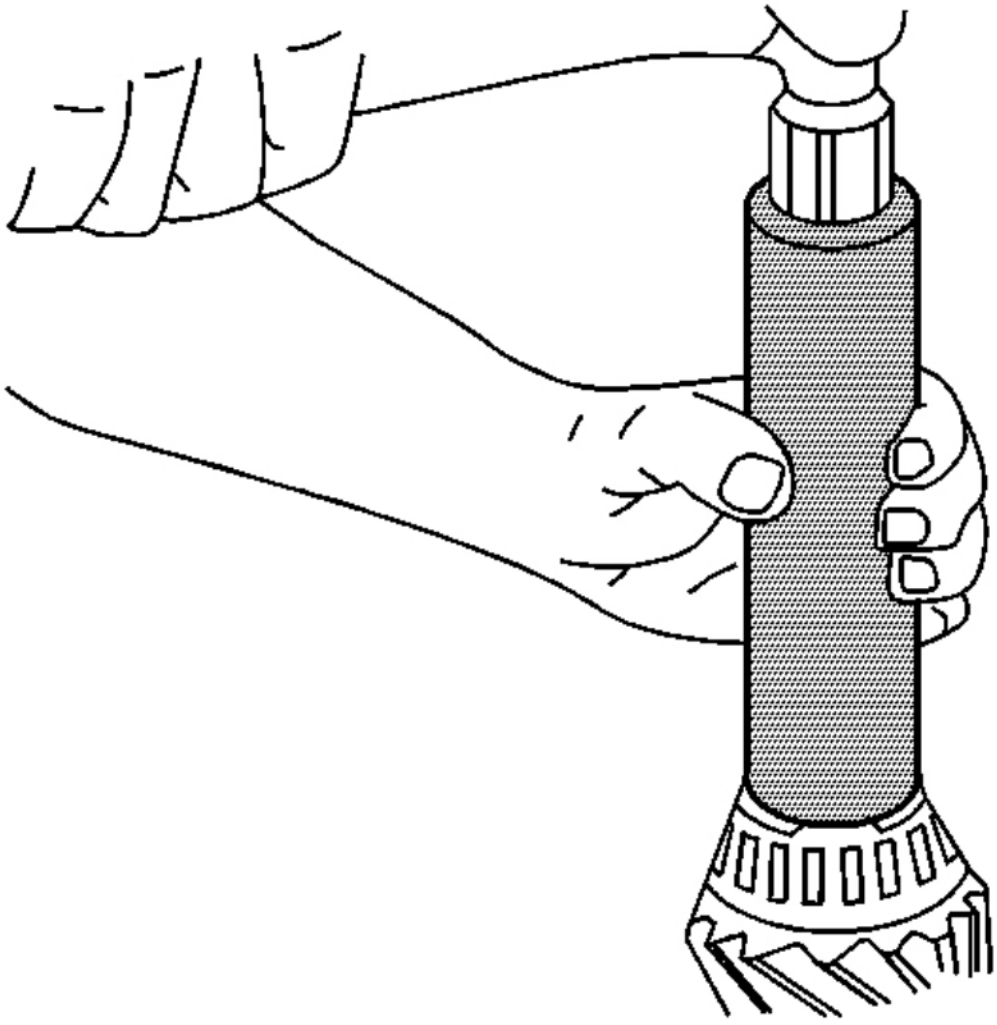


Fig. 165: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS CORP.

6. Install a new collapsible spacer.
7. Lubricate the pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
8. Install the outer pinion bearing into the axle housing.
9. Install a new pinion oil seal using the **J 22388** . See **Special Tools and Equipment**.

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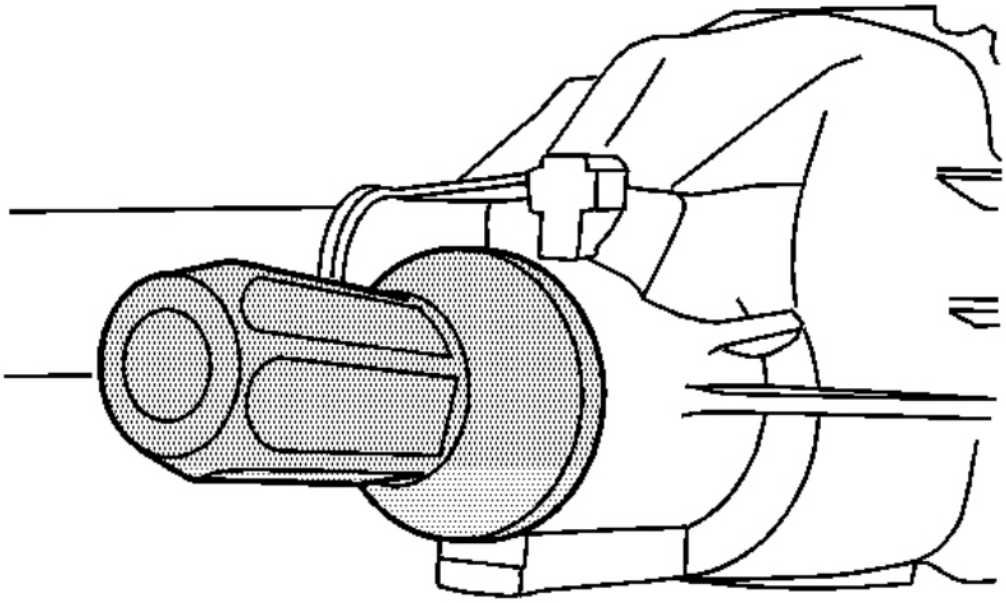


Fig. 166: Installing Pinion Oil Seal Using J 22388
Courtesy of GENERAL MOTORS CORP.

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.
12. Install the pinion yoke.

    Align the marks made during removal.

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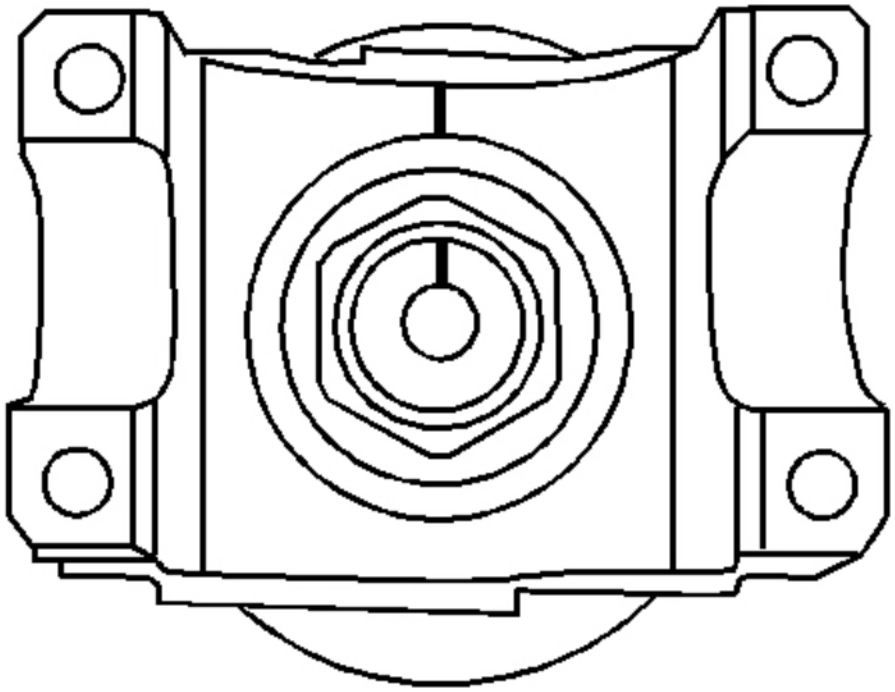


Fig. 167: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Pinion Flange/Yoke Installation Notice in Cautions and Notices.

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

NOTE: Refer to Fastener Notice in Cautions and Notices.

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

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tightening the nut to seat the bearings.

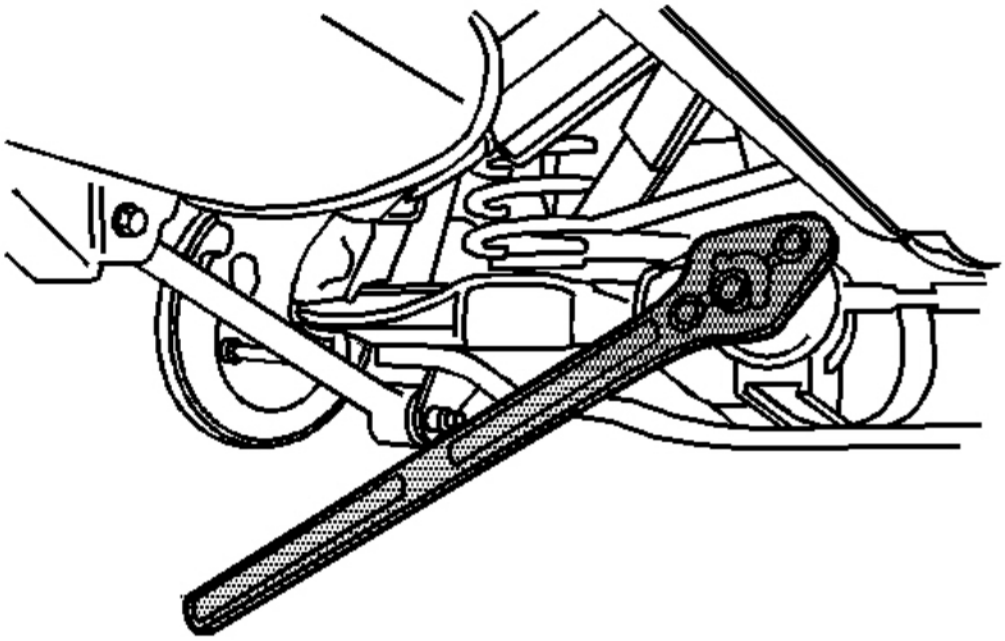


Fig. 168: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

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.

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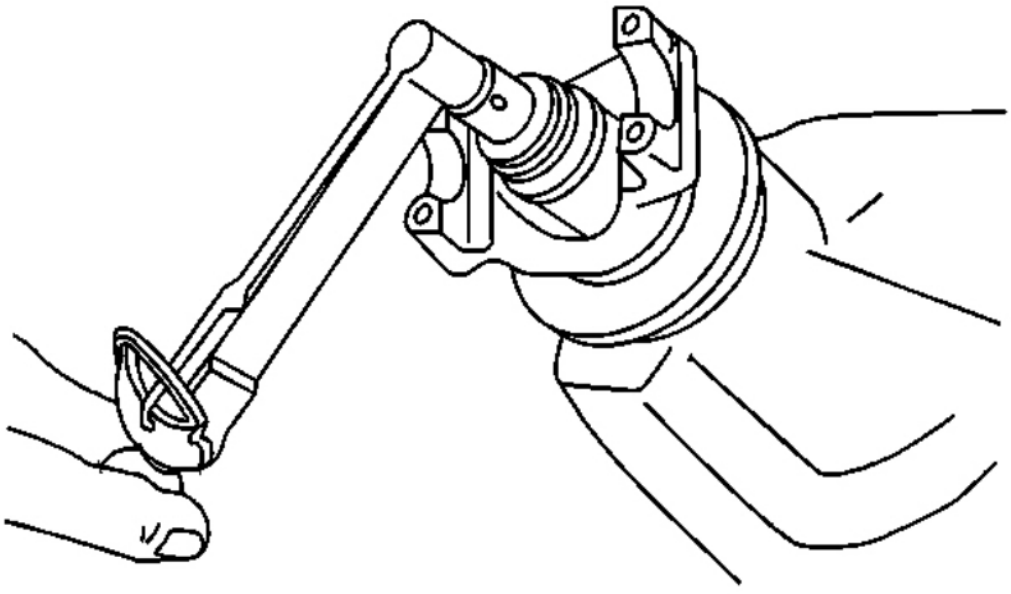


Fig. 169: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

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 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
21. Fill the axle with lubricant. Use the proper fluid. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
22. Lower the vehicle.

DRIVE PINION BEARINGS REPLACEMENT (9.75 INCH AXLE)

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Tools Required

- **J 22536** Pinion Driver. See **Special Tools and Equipment**.
- **J 22912-01** Split-Plate Bearing Puller
- **J 42176** Universal Driver Handle - Non-Threaded
- **J 45703** Pinion Bearing Race Remover - Dana 248
- **J 45704** Pinion Bearing Race Installer - Dana 248
- **J 45705** Pinion Bearing Race Remover - Dana 248/267
- **J 7818** Inner Bearing Race Installer
- **J 8092** Universal Drive Handle - 3/4 in - 10

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
3. Remove the pinion yoke and the 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 (9.75 Inch Axle)**.
4. Remove the thrust washer.

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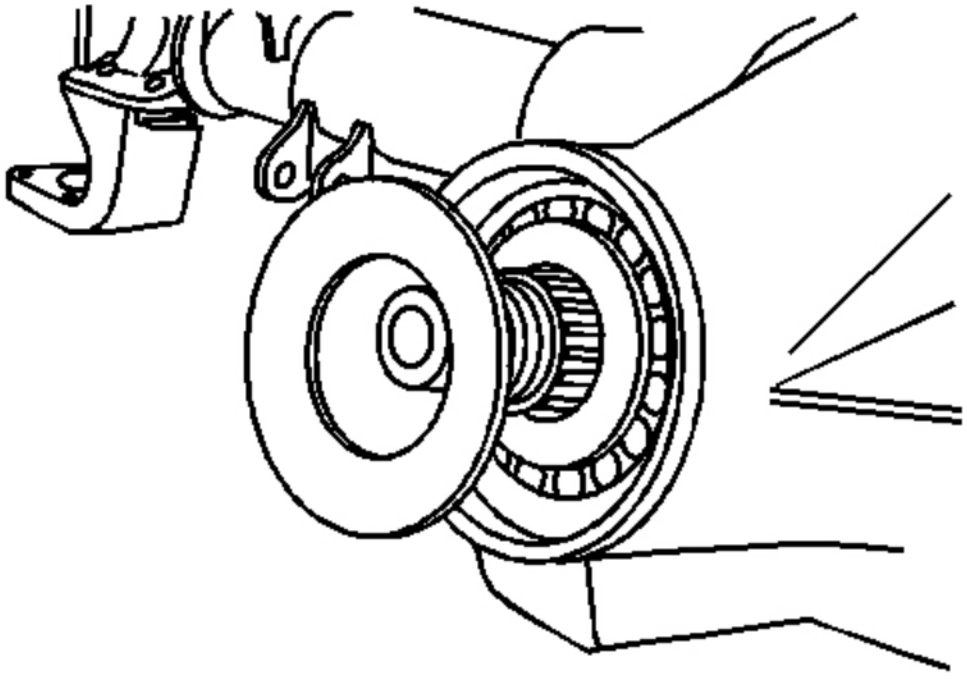


Fig. 170: View Of Thrust Washer (9.75 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

5. Install the **J 22536** as shown.

   Ensure that the **J 22536** is firmly seated on the pinion. See **Special Tools and Equipment**.

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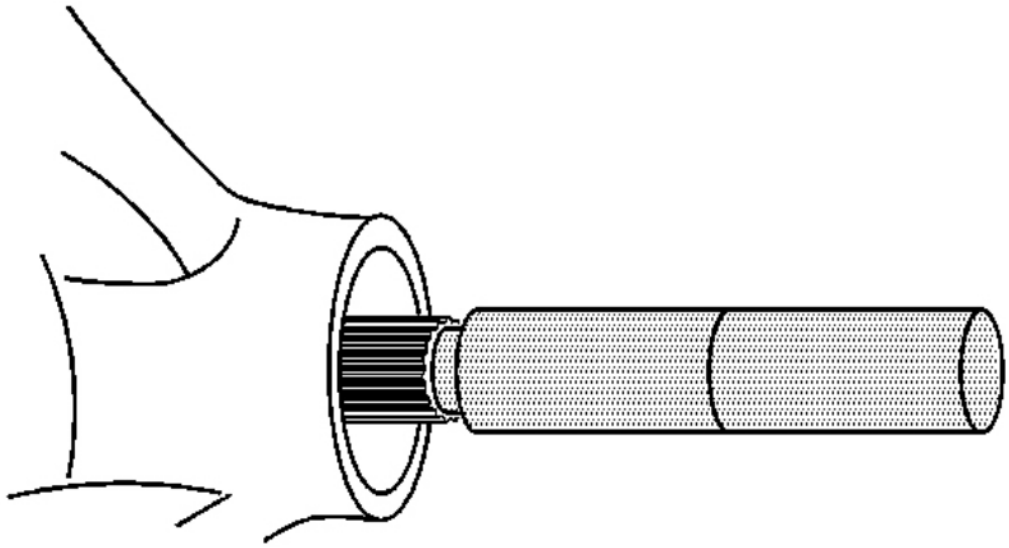


Fig. 171: Installing J 22536 Or J 44421 On Pinion
Courtesy of GENERAL MOTORS CORP.

6. Drive the pinion out using the **J 22536** and a hammer.

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

7. Remove the pinion preload shims from the drive pinion and set aside.
8. Remove the inner pinion bearing cup and the oil deflector using the **J 45703** (2) and the **J 42176** (1). See **Special Tools and Equipment**.

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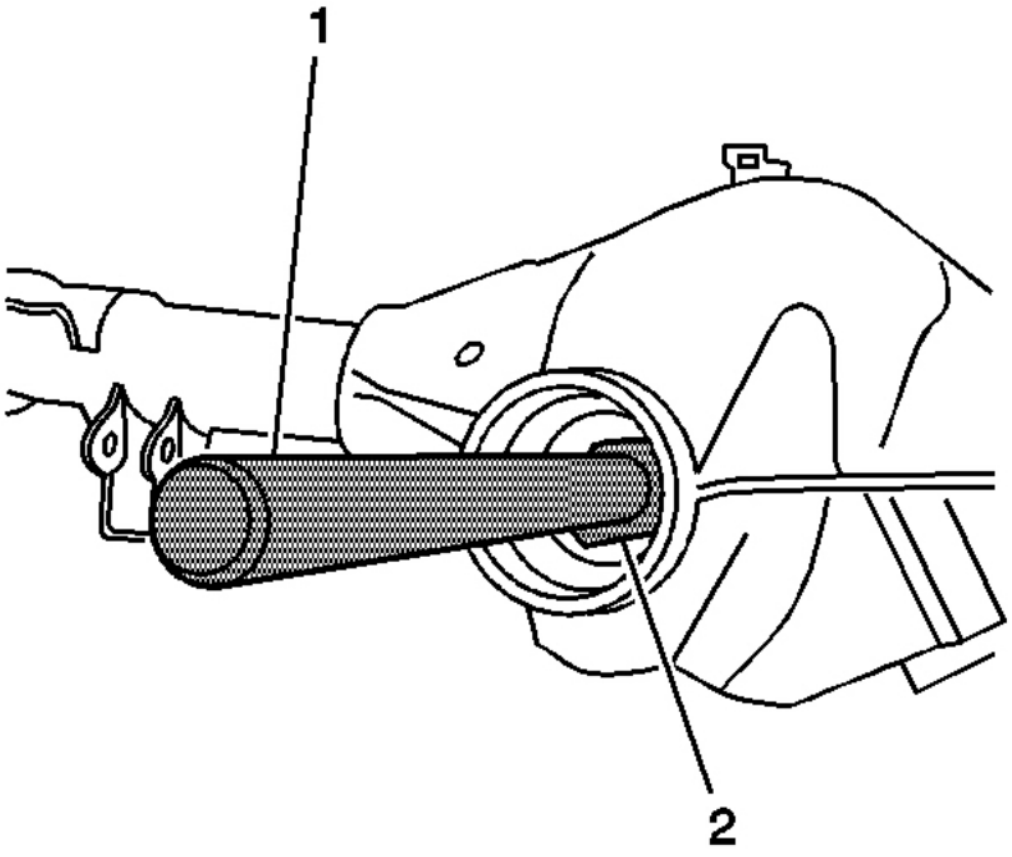


Fig. 172: Removing Inner Bearing Cup & Oil Deflector Using J 45703 & J 42176
Courtesy of GENERAL MOTORS CORP.

9. Remove the outer pinion bearing cup using the **J 45705** and the **J 42176** . See **Special Tools and Equipment**.
10. Remove the inner pinion bearing using the **J 22912-01** and a hydraulic press.

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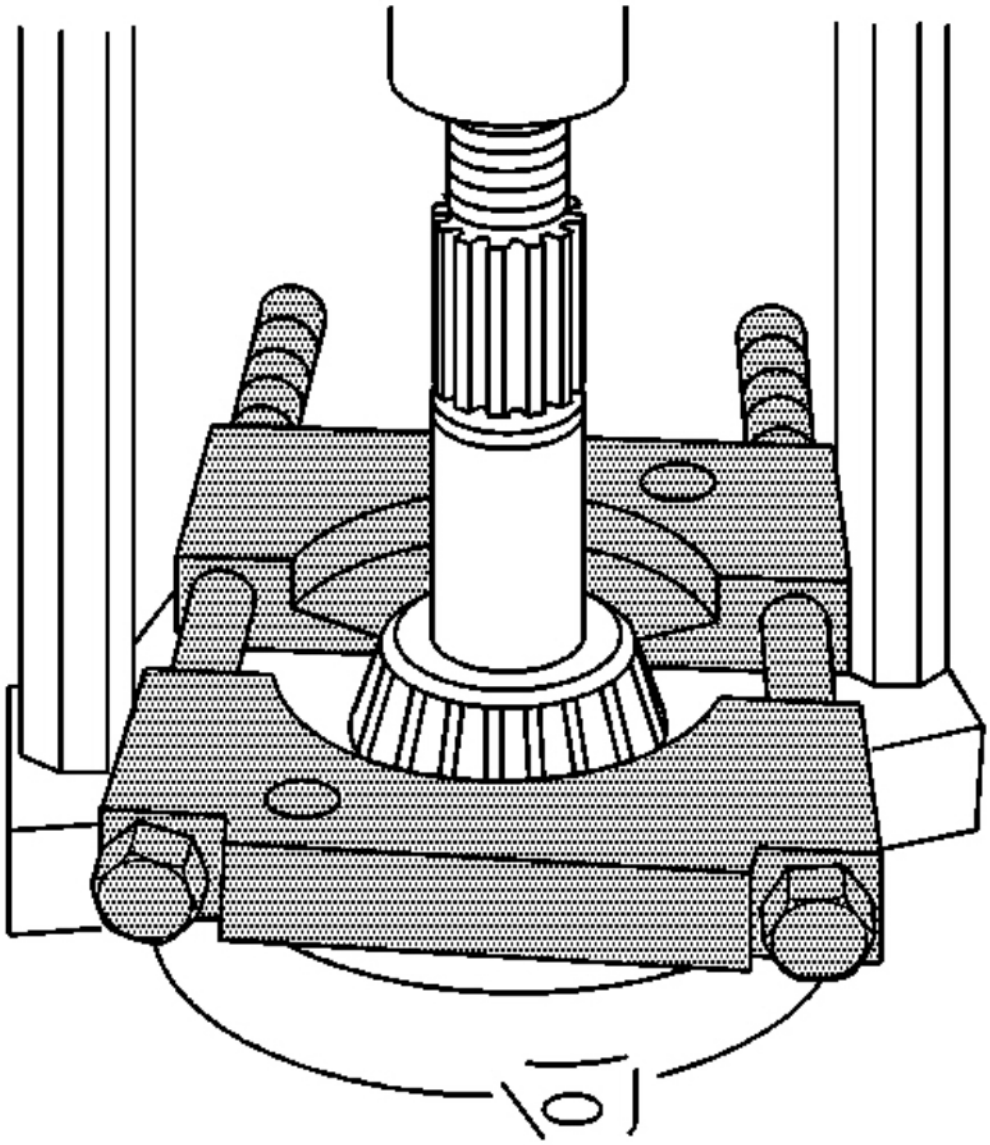


Fig. 173: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

11. Remove the pinion position shim.

Installation Procedure

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1. Install the oil deflector into the inner pinion cup bore.

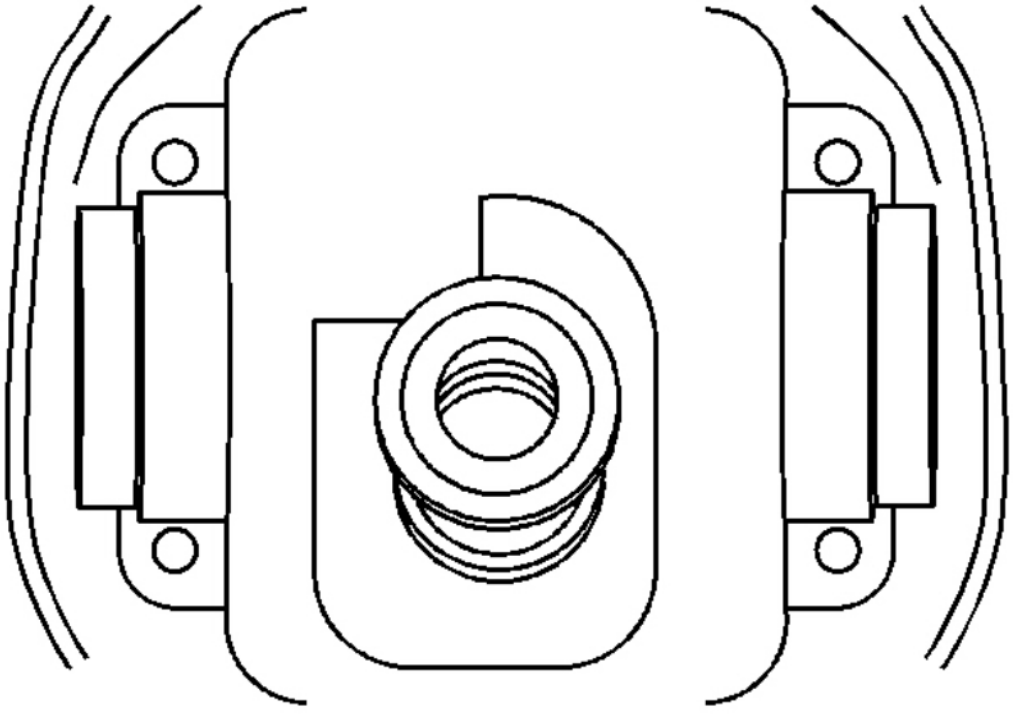


Fig. 174: Installing Oil Deflector Into Inner Pinion Cup Bore
Courtesy of GENERAL MOTORS CORP.

2. Install the inner pinion bearing cup using the **J 45704** (2) and the **J 8092** (1). See **Special Tools and Equipment**.

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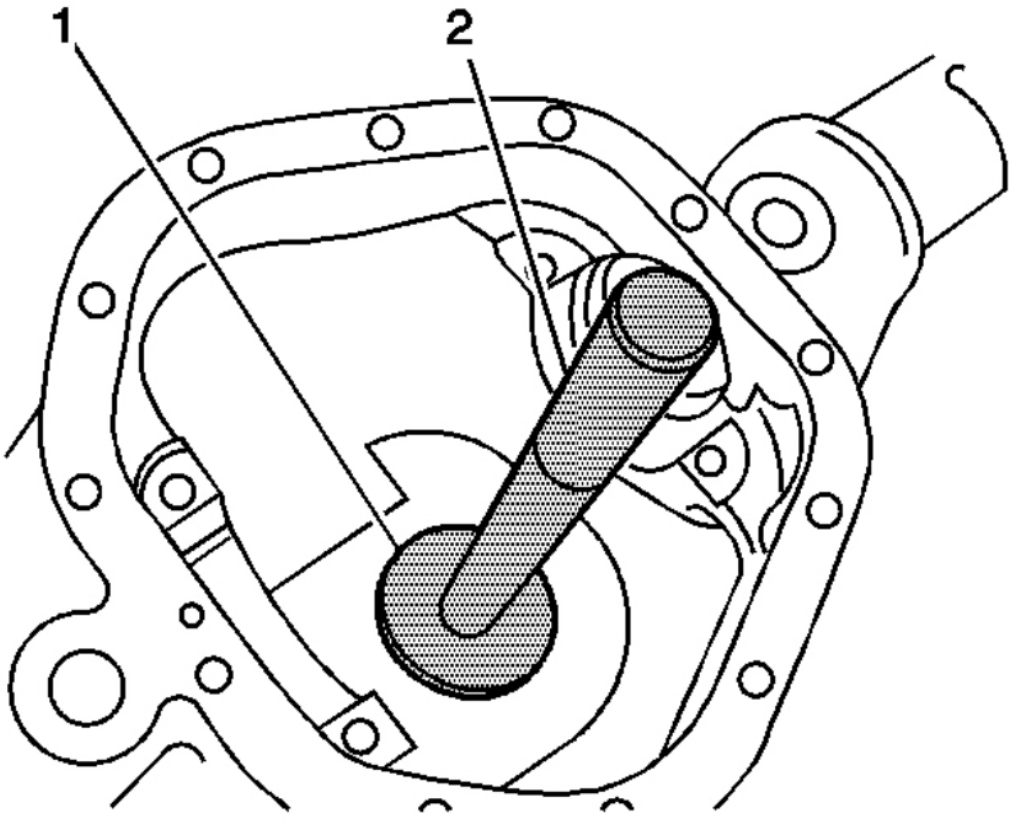


Fig. 175: Installing Inner Pinion Bearing Cup Using J 45704 & J 8092
Courtesy of GENERAL MOTORS CORP.

3. Install the outer pinion bearing cup using the **J 7818** (2) and the **J 8092** (1). See **Special Tools and Equipment**.

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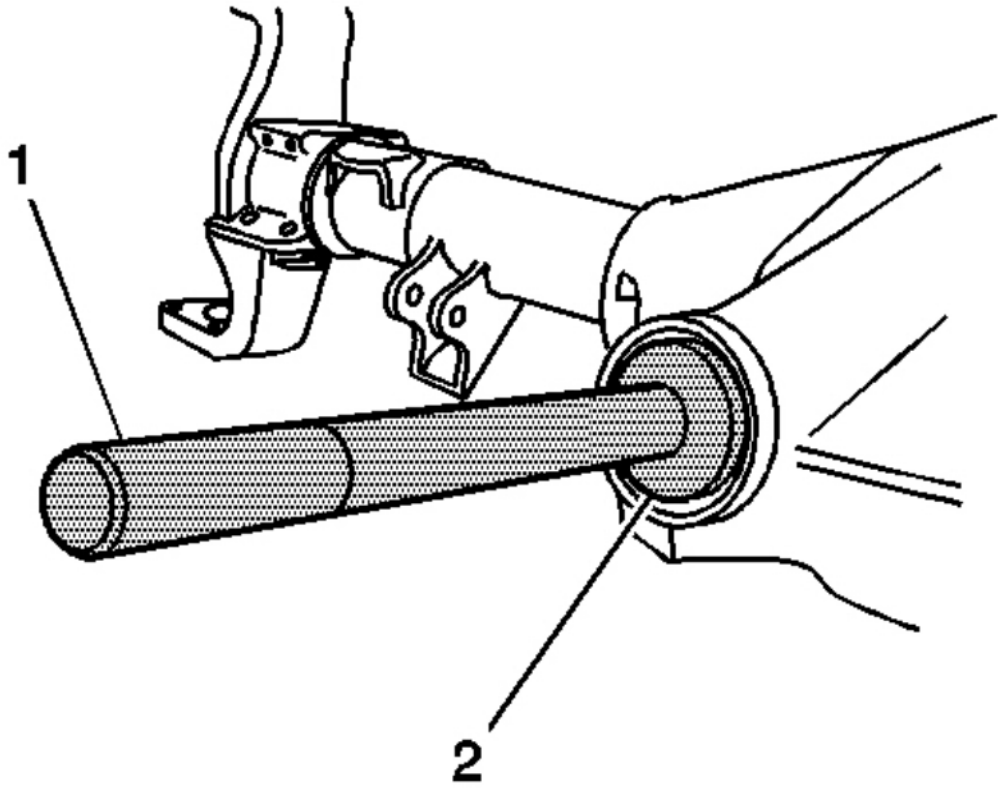


Fig. 176: Installing Outer Pinion Bearing Cup Using J 7818 & J 8092
Courtesy of GENERAL MOTORS CORP.

4. Determine the pinion position shim thickness and the pinion preload shim thickness for the drive pinion. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.
5. Install the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
6. Fill the axle with lubricant. Use the proper fluid. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
7. Lower the vehicle.

DRIVE PINION BEARINGS REPLACEMENT (10.5 INCH AXLE)

Tools Required

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

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 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.
6. Remove the pinion.

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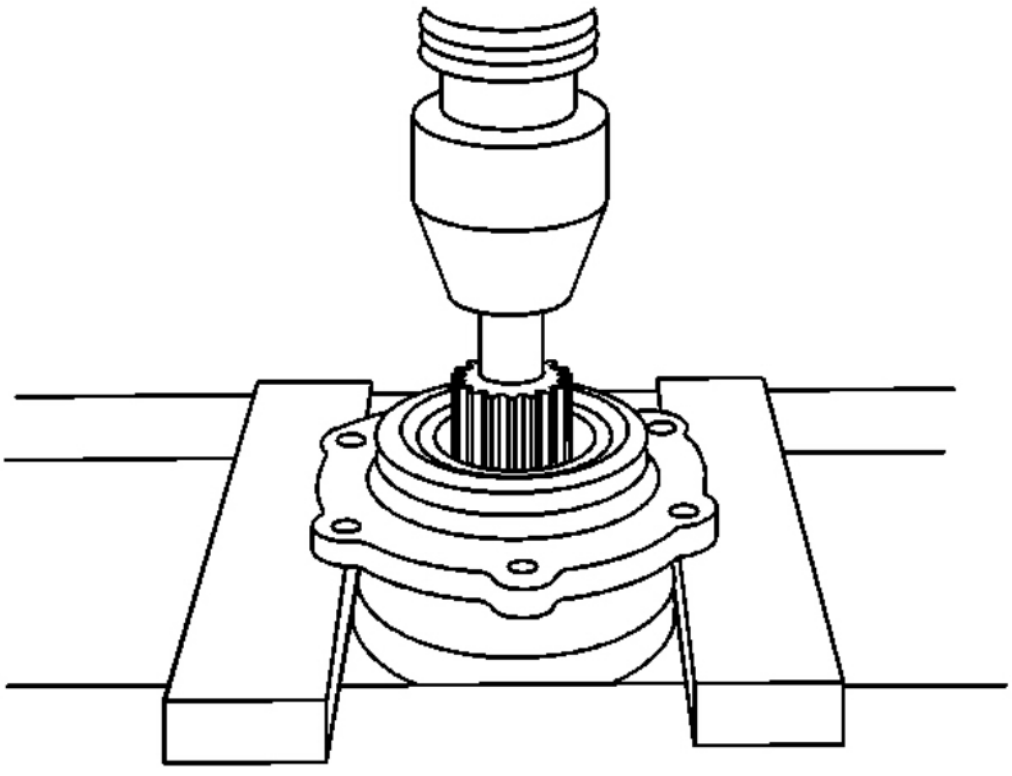


Fig. 177: View Of Pinion
Courtesy of GENERAL MOTORS CORP.

7. Remove the collapsible spacer.

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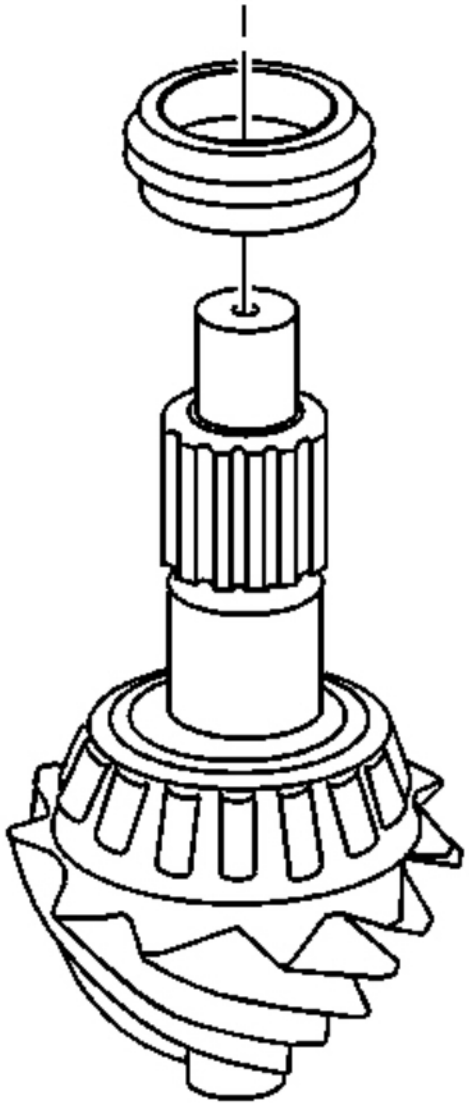


Fig. 178: View Of Collapsible Spacer
Courtesy of GENERAL MOTORS CORP.

8. Remove the inner pinion bearing from the pinion using the **J 22912-01** and a hydraulic press.

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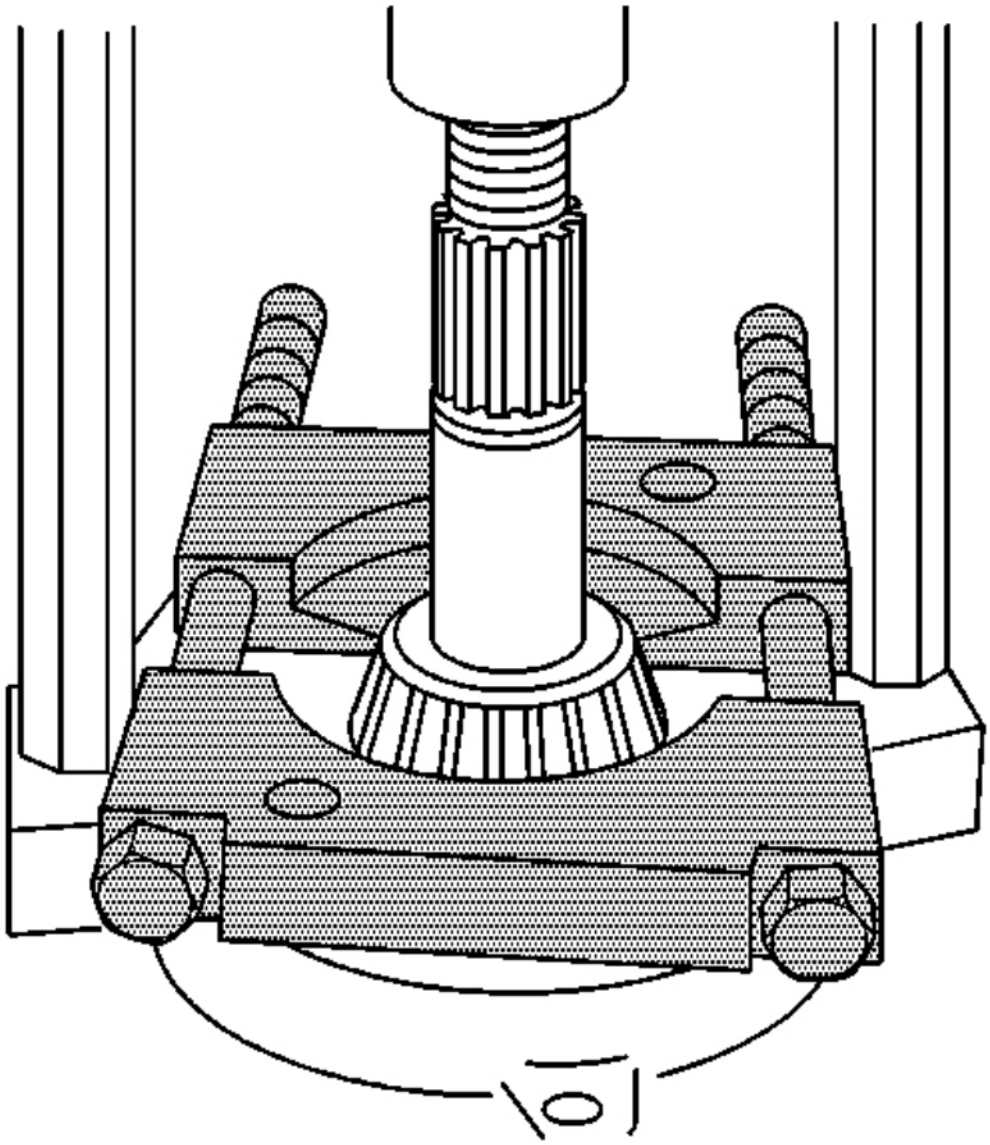


Fig. 179: Removing Inner Pinion Bearing Using Hydraulic Press
Courtesy of GENERAL MOTORS CORP.

9. 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.

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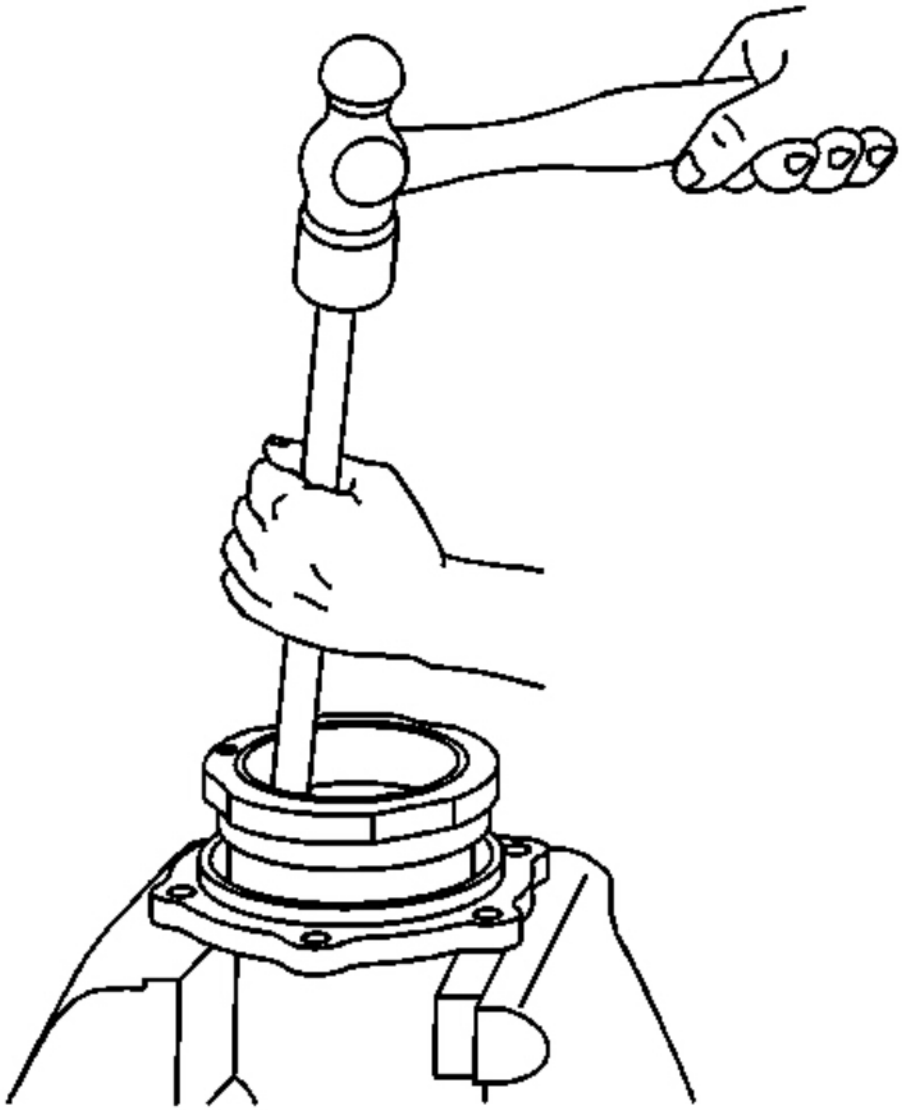


Fig. 180: Removing Outer Pinion Bearing Cup Using Hammer & Brass Drift
Courtesy of GENERAL MOTORS CORP.

10. 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.

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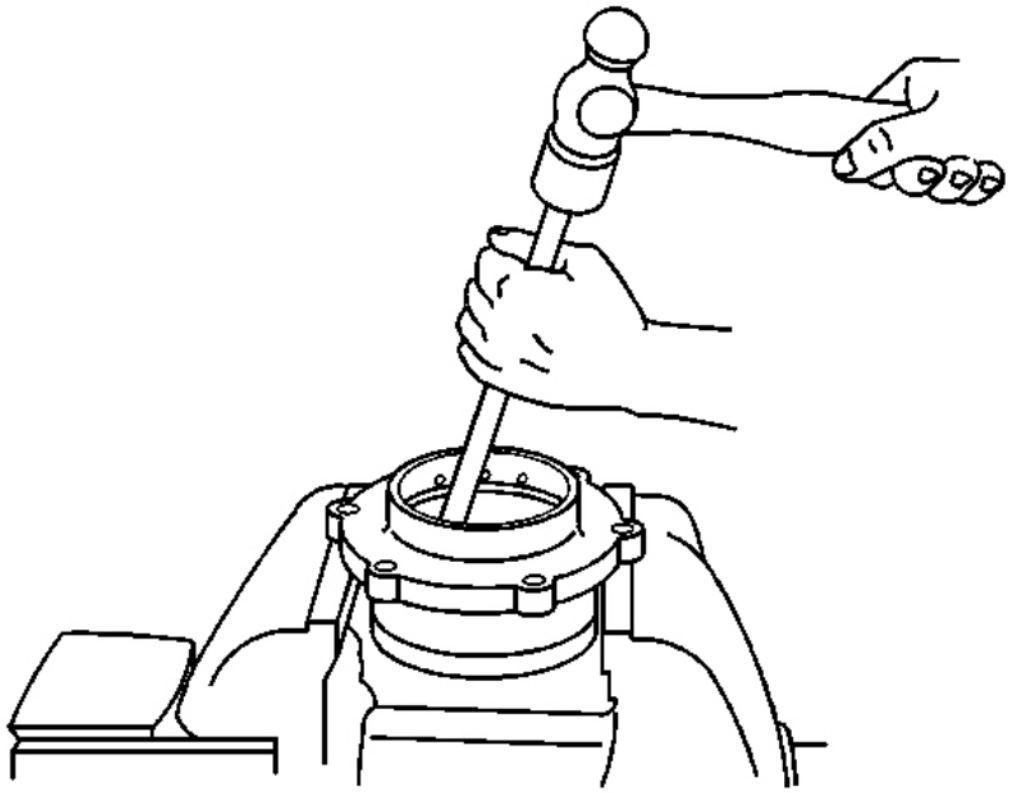


Fig. 181: Removing Inner Pinion Bearing Cup Using Hammer & Brass Drift
Courtesy of GENERAL MOTORS CORP.

11. Remove the pinion gear pilot bearing using a brass drift and a hammer.

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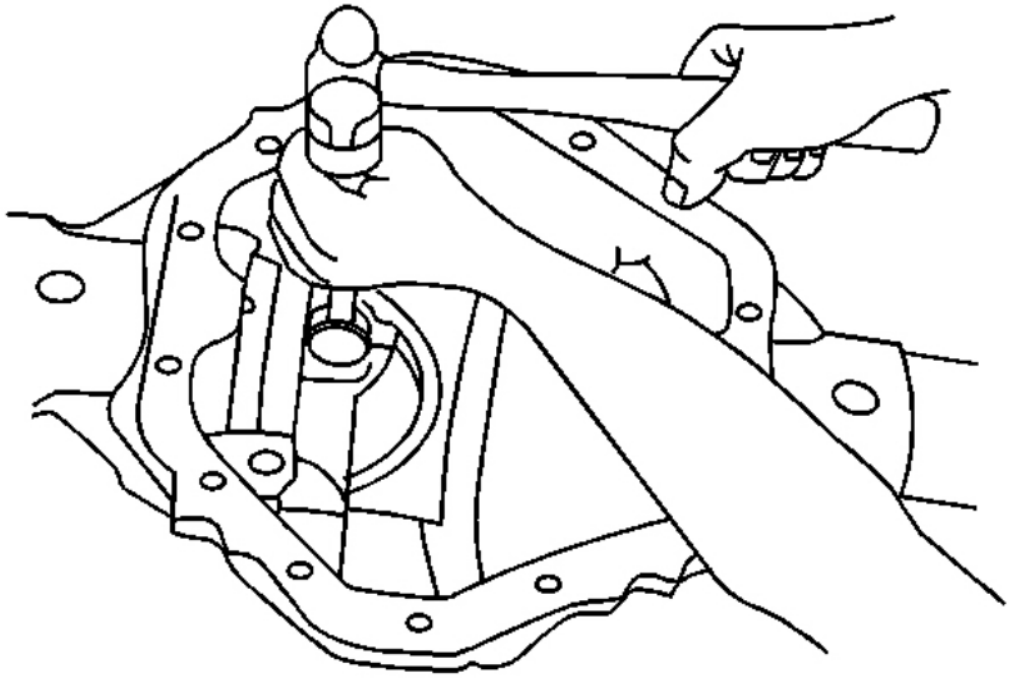


Fig. 182: Removing Pinion Gear Pilot Bearing Using Hammer & Brass Drift
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the pinion gear pilot bearing using the **J 22761** .
2. 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 and Equipment**.

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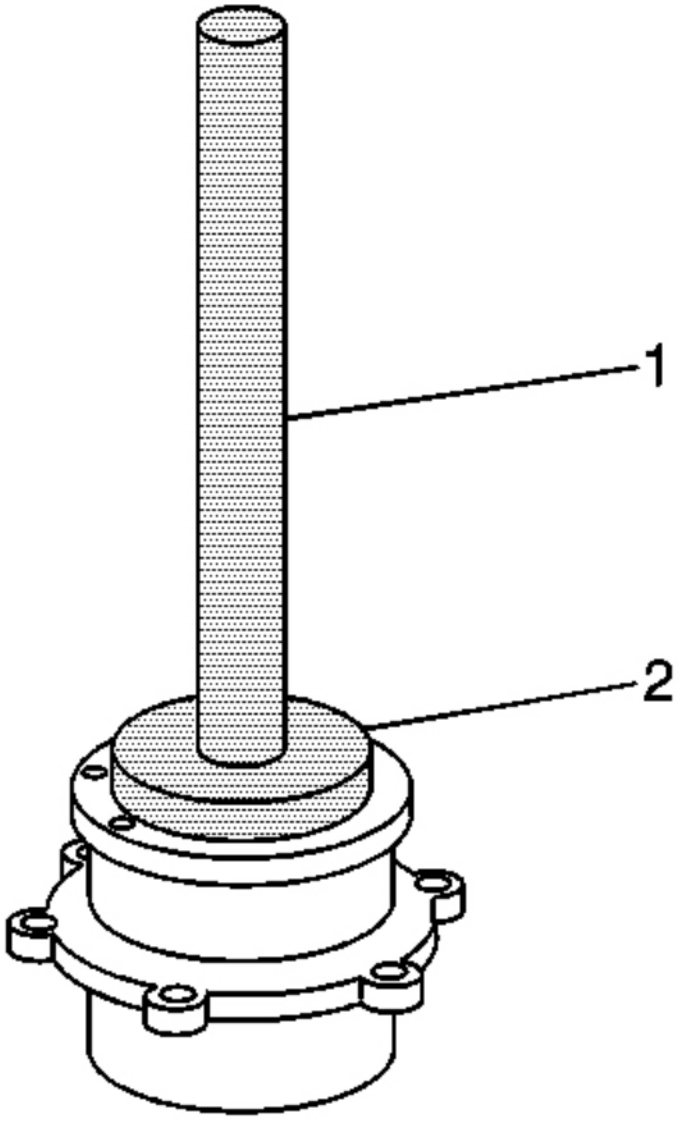


Fig. 183: Installing Inner Pinion Bearing Cup Using J 37624 & J 8092
Courtesy of GENERAL MOTORS CORP.

3. 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 and Equipment**.

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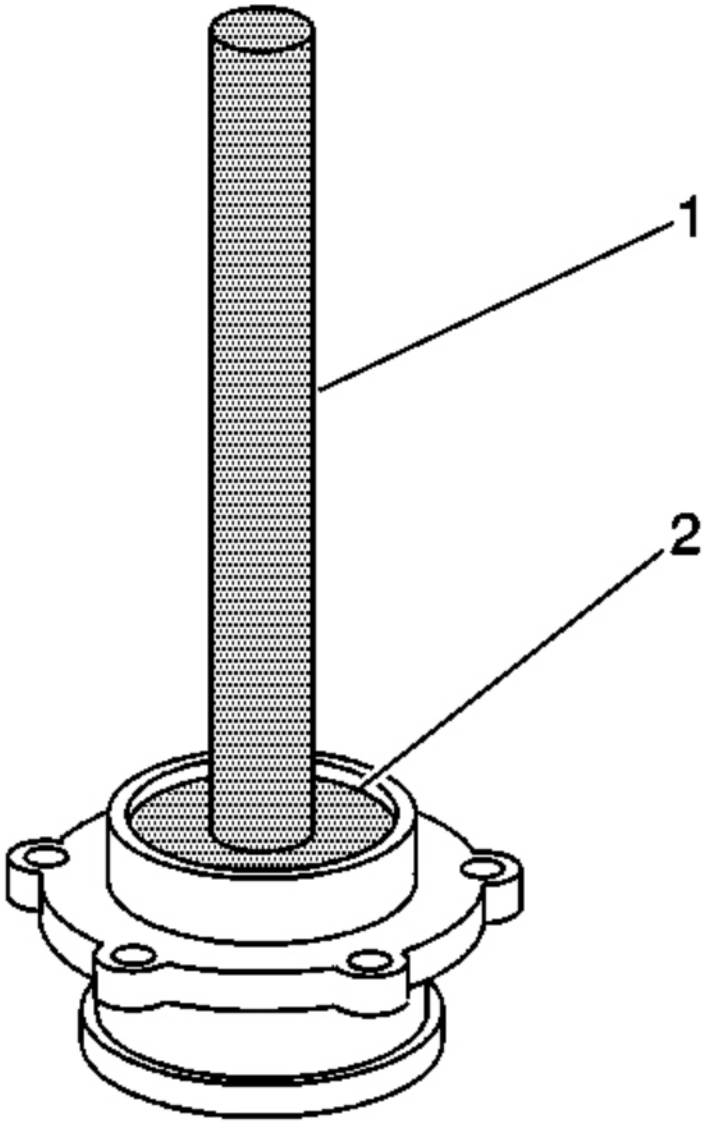


Fig. 184: Installing Outer Pinion Bearing Cup Using J 8608 & J 8092
Courtesy of GENERAL MOTORS CORP.

4. Install the inner pinion bearing using the **J 24433** . See **Special Tools and Equipment**.

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

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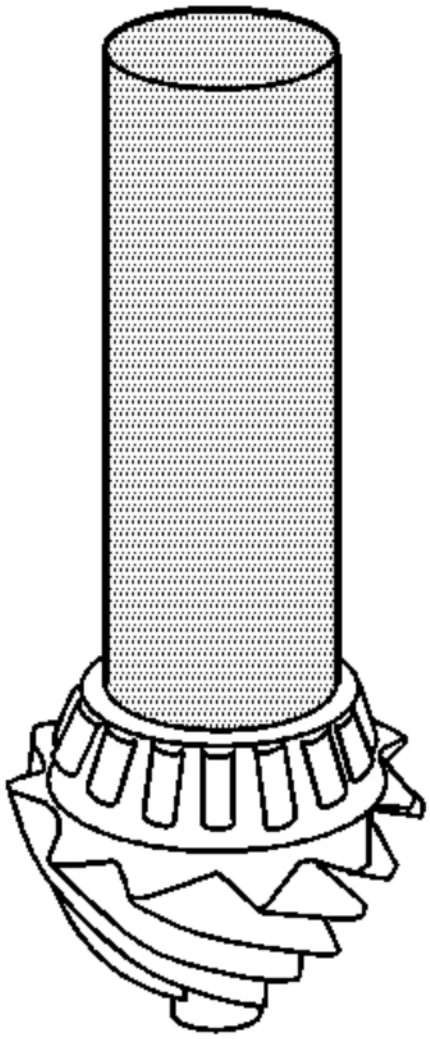


Fig. 185: Installing Inner Pinion Bearing Using J 24433
Courtesy of GENERAL MOTORS CORP.

5. Install a new collapsible spacer.
6. Lubricate the pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
7. Install the outer pinion bearing into the pinion bearing retainer.
8. Install a new pinion oil seal using the **J 44414** . See **Special Tools and Equipment**.
9. Install the pinion into the pinion gear bearing retainer.

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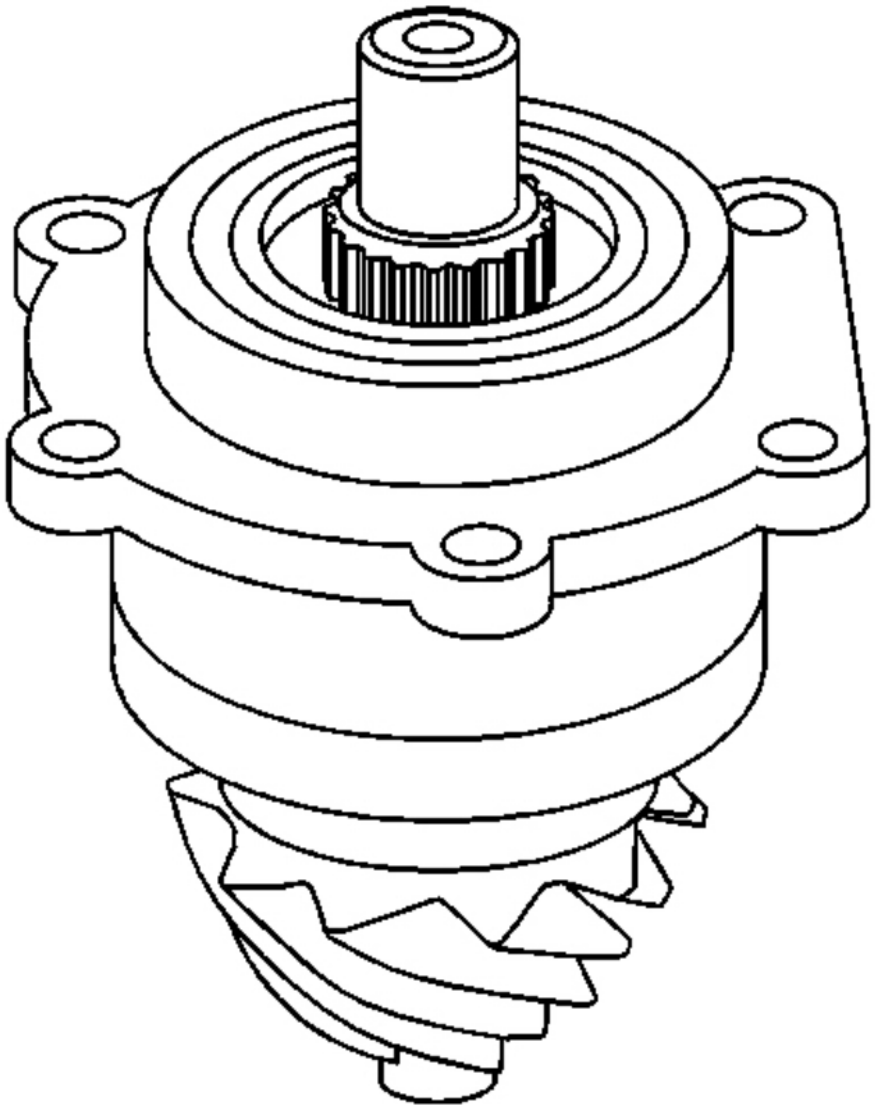


Fig. 186: View Of Pinion Into Pinion Gear Bearing Retainer
Courtesy of GENERAL MOTORS CORP.

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

    Align the marks made during removal.

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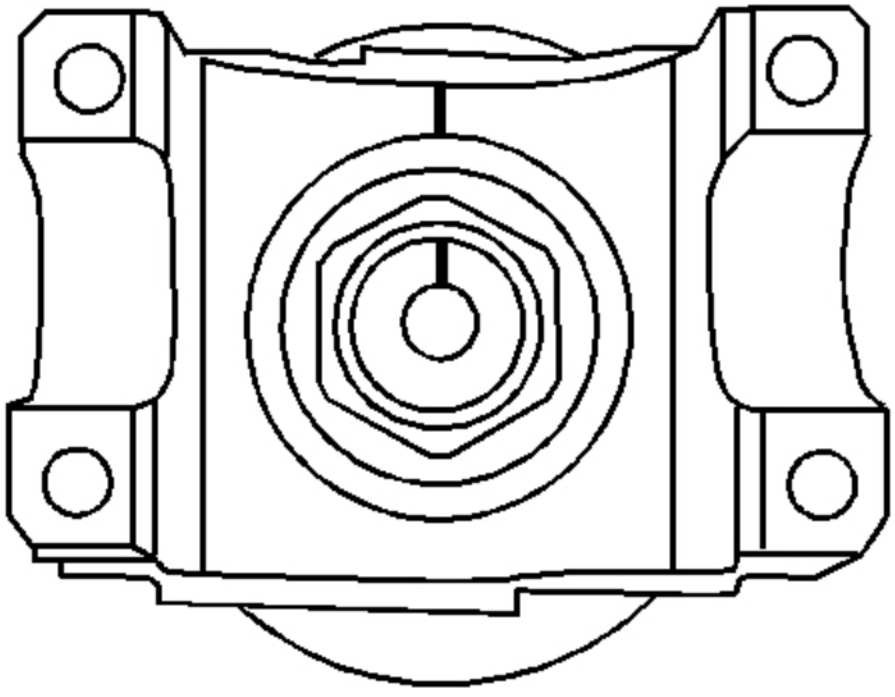


Fig. 187: View Of Pinion Shaft & Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Pinion Flange/Yoke Installation Notice in Cautions and Notices.

12. Seat the pinion yoke onto the pinion shaft by tapping it with a soft-faced hammer until a few threads show through the yoke.
13. Install the washer and a new pinion nut.
14. Install the **J 8614-01** onto the pinion yoke.

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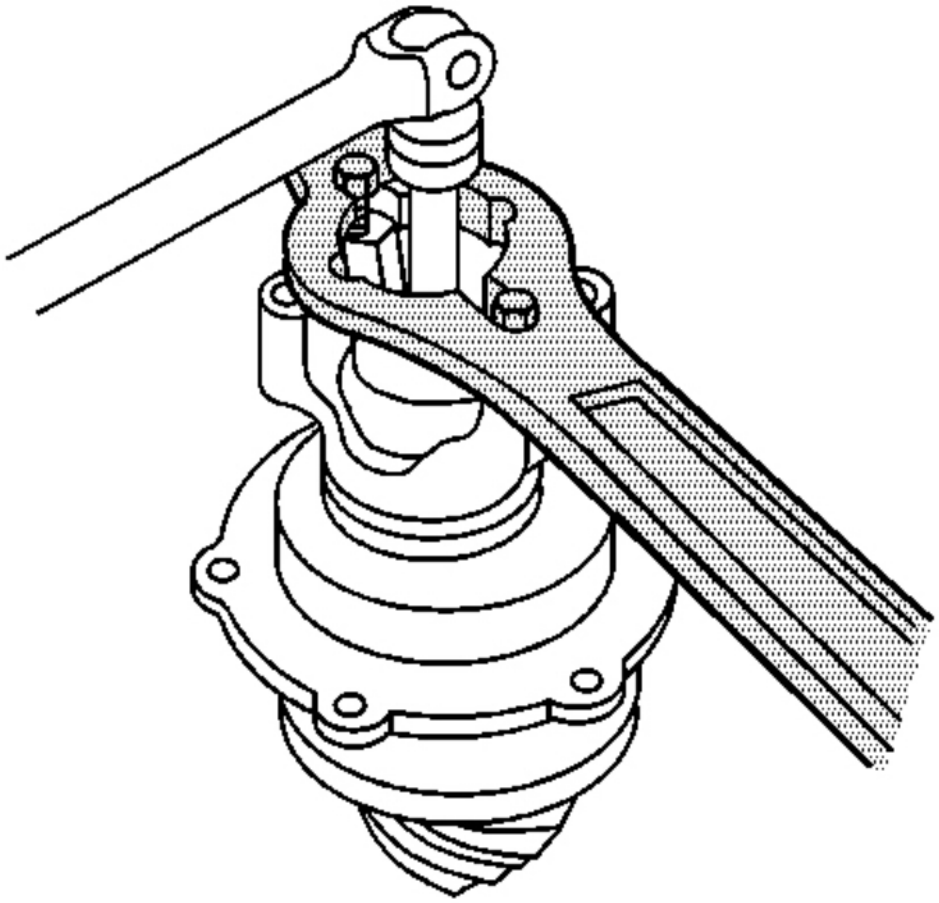


Fig. 188: Installing J 8614-01 Onto Pinion Yoke
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice in Cautions and Notices.**

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

15. 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.

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

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

17. 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.
18. Install the pinion gear bearing retainer to the axle housing.
19. Install the pinion bearing retainer bolts.

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

20. 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.

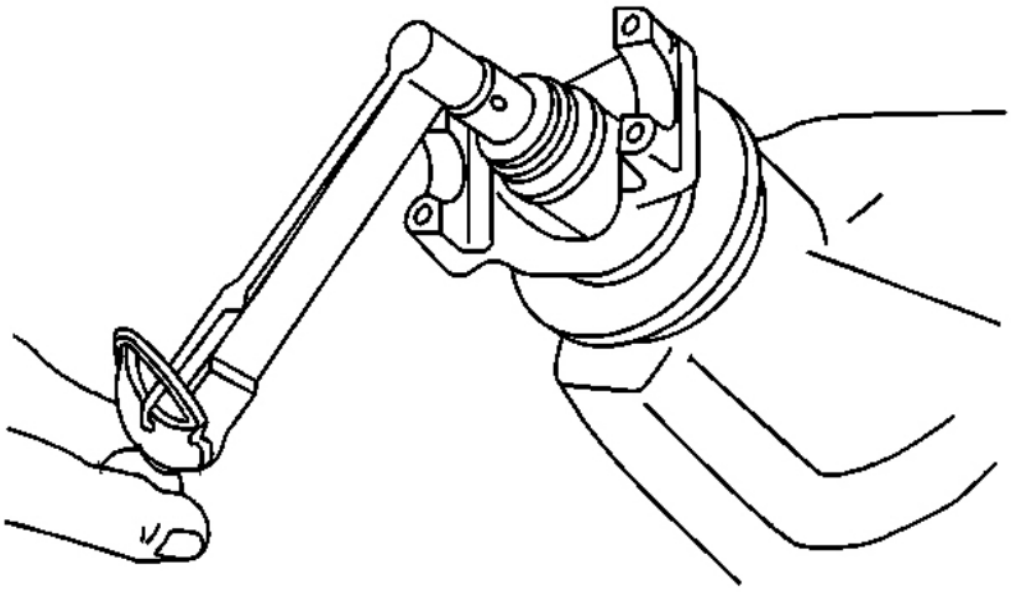


Fig. 189: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS CORP.

21. 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.

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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.

22. 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.

23. Install the differential assembly Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
24. Adjust the differential side bearing preload. Refer to **Differential Side Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.5 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.75 Inch Axle)** or **Differential Side Bearing Preload Adjustment (10.5 Inch Axle)**.
25. Determine the selective shim thickness for the drive pinion. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.
26. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.
27. Fill the axle with lubricant. Use the proper fluid. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
28. Lower the vehicle.

DIFFERENTIAL REPLACEMENT (8.6 INCH, 9.5 INCH AXLES)

Tools Required

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

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** in General Information.
2. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.

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

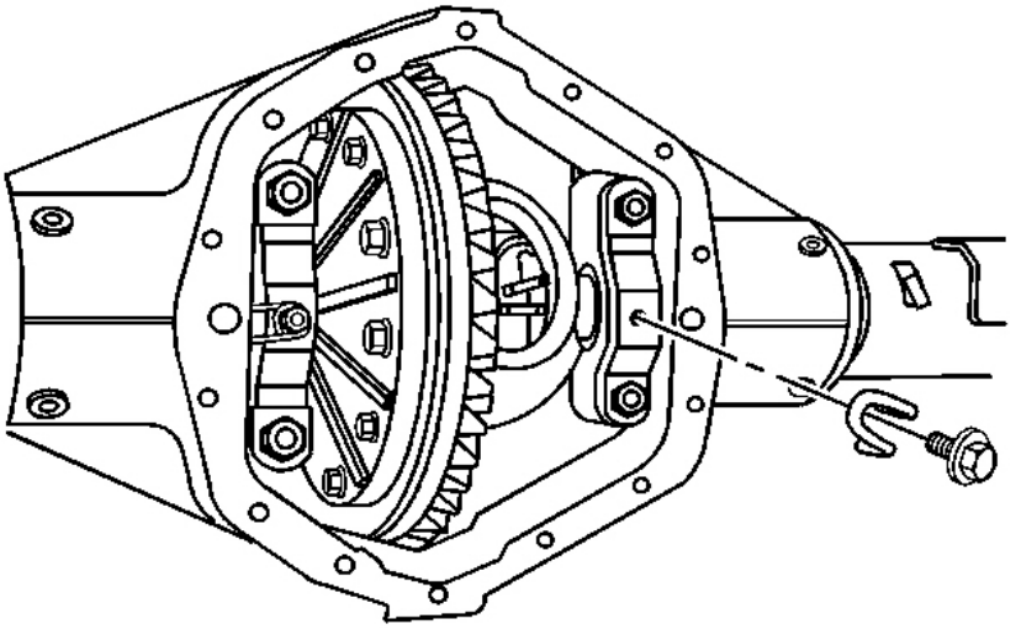


Fig. 190: View Of Differential Bearing Adjuster Nut Lock/Retainer
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Differential Case Removal Caution in Cautions and Notices.

4. Remove the bearing cap bolts.

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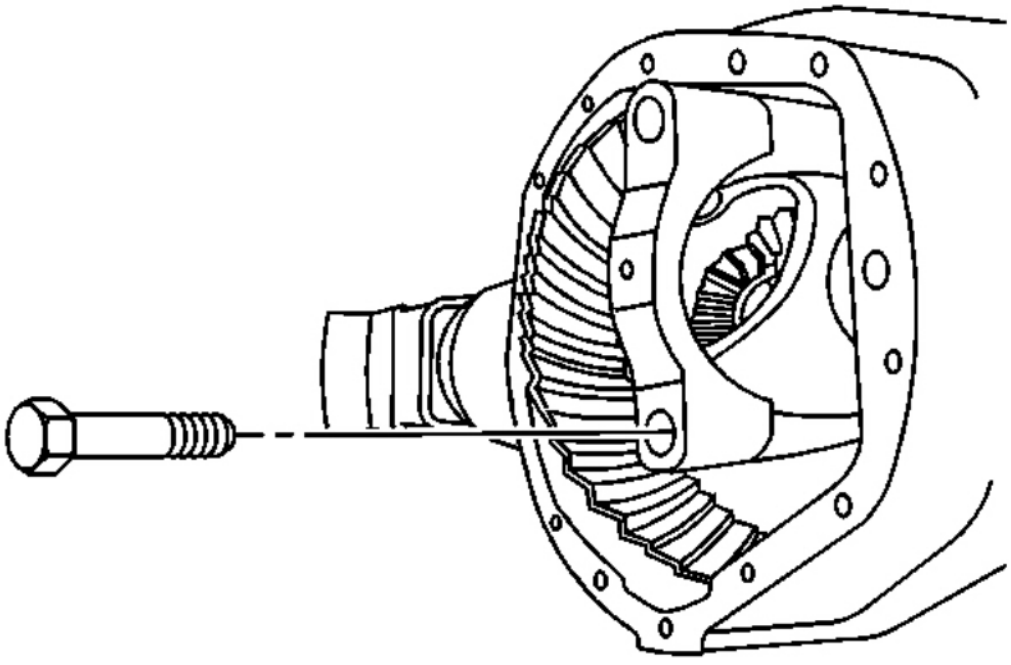


Fig. 191: Removing/Installing Bearing Cap Bolt
Courtesy of GENERAL MOTORS CORP.

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

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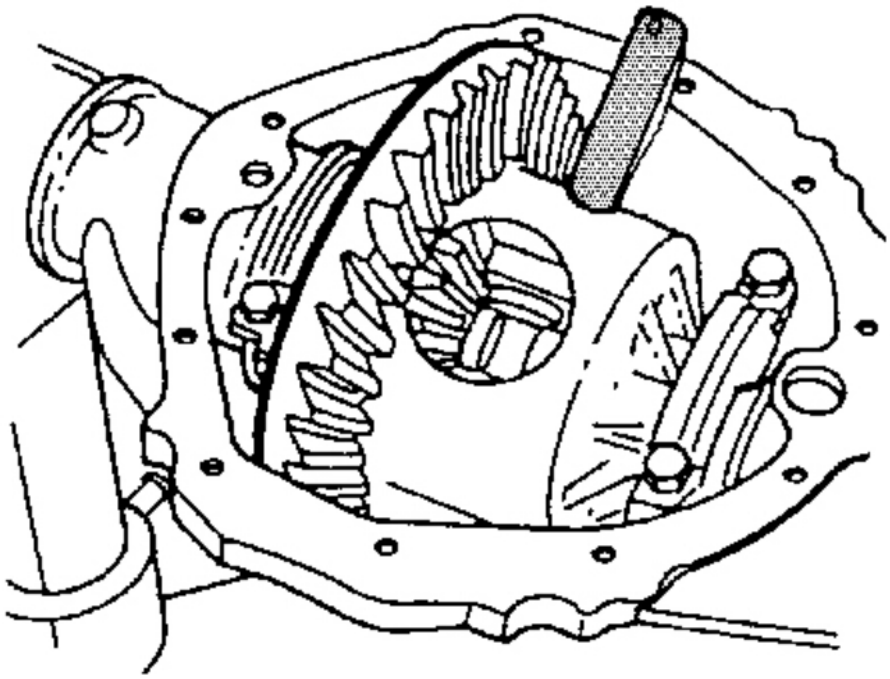


Fig. 192: Pinion Shaft Contacting Axle Housing Top
Courtesy of GENERAL MOTORS CORP.

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

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 inch axle, loosen the differential bearing adjuster nut using the **J 24429** . See **Special Tools and Equipment**.
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)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.

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12. Remove the ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.
3. Lubricate the differential side bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
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.

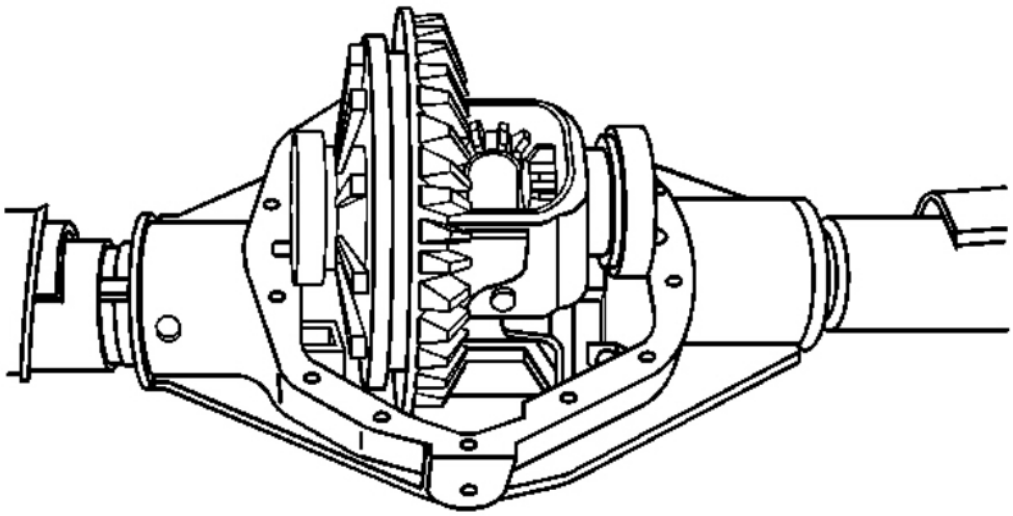


Fig. 193: View Of Differential Case And Axle Housing
Courtesy of GENERAL MOTORS CORP.

5. Install the bearing caps and the bolts. Do not torque the bearing cap bolts at this time.

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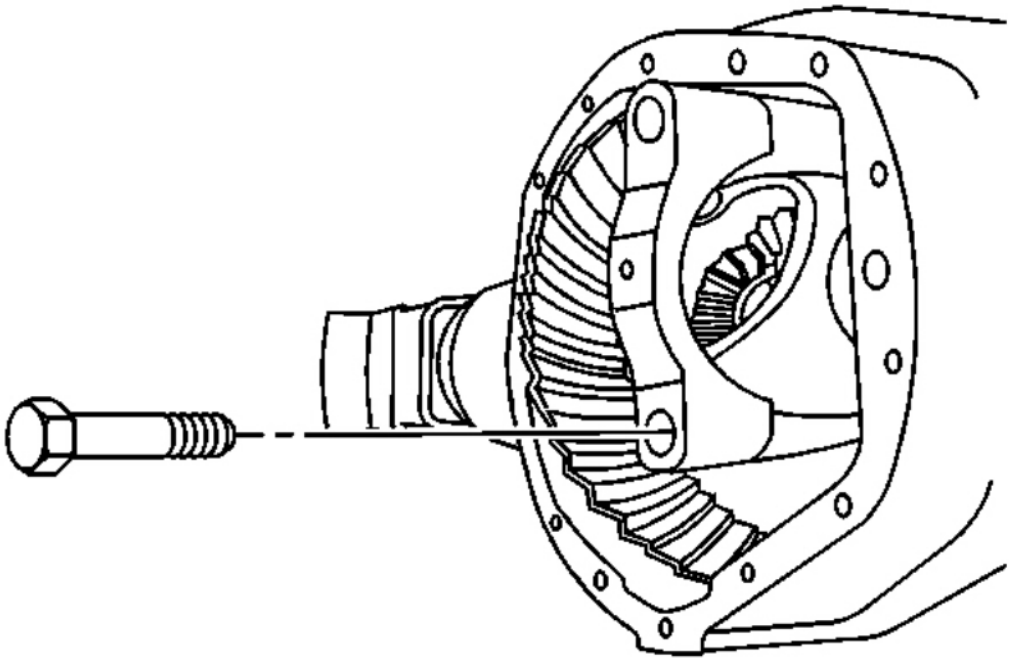


Fig. 194: Removing/Installing Bearing Cap Bolt
Courtesy of GENERAL MOTORS CORP.

6. Adjust the differential side bearing preload. Refer to **Differential Side Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.5 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.75 Inch Axle)** or **Differential Side Bearing Preload Adjustment (10.5 Inch Axle)**.
7. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.
8. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.
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 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/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
11. Fill the axle with the proper lubricant. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch**

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Axle) or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.

12. Lower the vehicle.

DIFFERENTIAL REPLACEMENT (9.75 INCH AXLE)

Tools Required

- **J 24385-C** Axle Housing Spreader. See **Special Tools and Equipment**.
- **J 25025** Guide Pins
- **J 34178** Spreader Gage Adapter
- **J 8001** Dial Indicator Set

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
3. Loosen the bearing cap bolts.

   Do not remove the bearing cap bolts at this time.

4. Install the **J 24385-C** onto the axle housing as shown. See **Special Tools and Equipment**.

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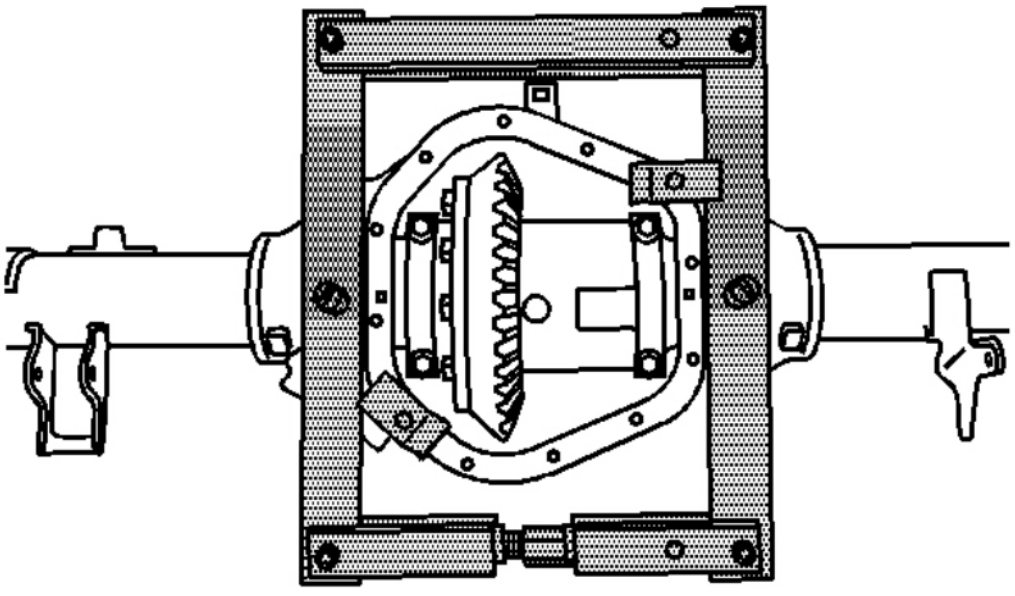


Fig. 195: Installing J 24385-C Onto Axle Housing
Courtesy of GENERAL MOTORS CORP.

5. Install the **J 25025** (2), the J 8001-1 and the J 8001-2 (1), the **J 34178** (3), and the J 8001-3 and the J 8001-4 (4) onto the axle housing as shown. See **Special Tools and Equipment**.

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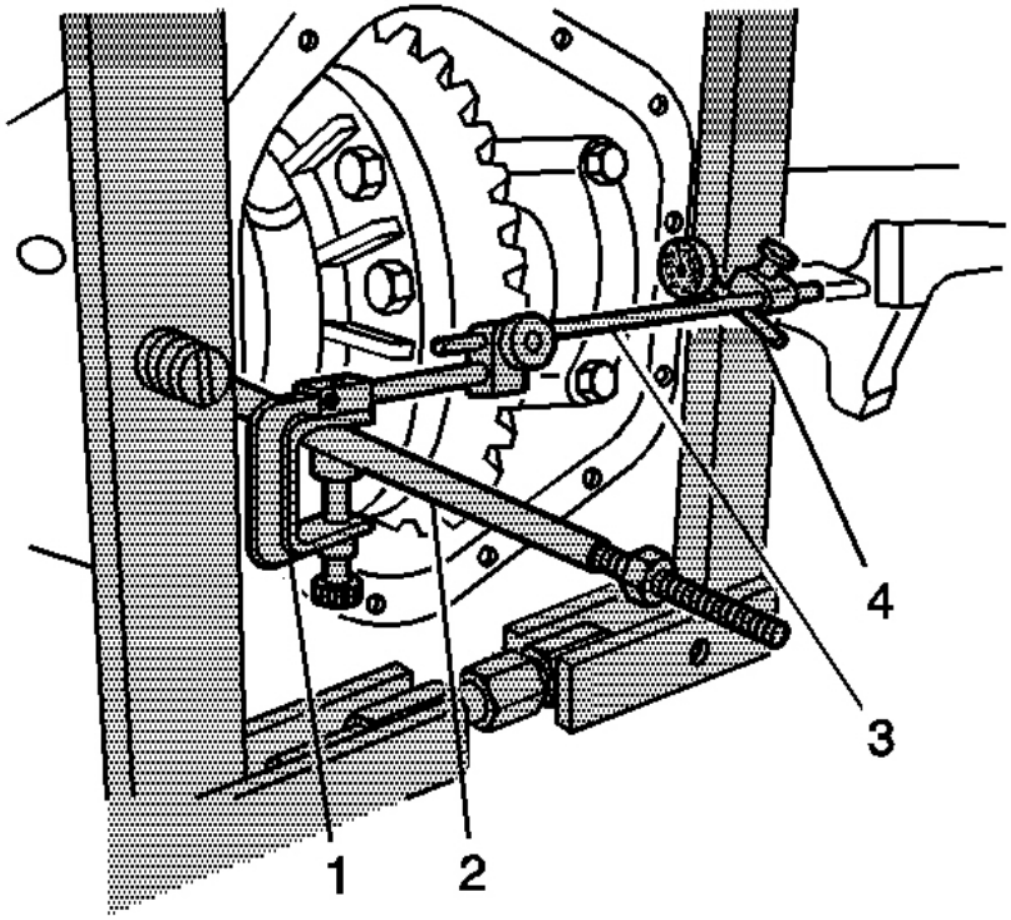


Fig. 196: Installing J 25025, J 8001-2, J 34178 & J 8001-4 Onto Axle Housing
Courtesy of GENERAL MOTORS CORP.

6. Preload the dial of the J 8001-3 by pushing the J 8001-3 against the edge of the **J 24385-C** until the needle of the J 8001-3 has moved approximately 3/4 of a turn clockwise.
7. Rotate the indicator housing to align the indicator needle of the J 8001-3 and the dial indicator face to ZERO. See **Special Tools and Equipment**.

NOTE: Do not spread the axle housing more than 0.38 mm (0.015 inch). Overspreading the housing may result in component damage.

8. Spread the axle housing by turning the clevis screw of the **J 24385-C** clockwise while observing the **J 8001** . See **Special Tools and Equipment**.

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Spread the housing just enough to remove the differential assembly.

9. Remove the **J 25025-B** , the J 8001-1 , the J 8001-2 , the **J 34178** , the J 8001-3 and the J 8001-4 from the axle housing. See **Special Tools and Equipment**.

CAUTION: Refer to Differential Case Removal Caution in Cautions and Notices.

10. Remove the bearing cap bolts.

IMPORTANT: Corresponding letters are stamped on the bearing caps and axle housing. The bearing caps must be reassembled in the same position as removed.

11. Remove the bearing caps.
12. Remove the differential assembly.
13. Remove the **J 24385-C** . See **Special Tools and Equipment**.
14. Remove the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
15. Remove the differential side bearings, if necessary. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.

Installation Procedure

1. Install the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
2. Determine the total shim pack size for the differential assembly. Refer to **Determining Total Shim Pack Size**.
3. Install the differential side bearings, if necessary. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.
4. Install the **J 24385-C** onto the axle housing. See **Special Tools and Equipment**.
5. Install the **J 25025-B** (4), the J 8001-1 and the J 8001-2 (5, 1), the **J 34178** (2), and the J 8001-3 and the J 8001-4 (3) onto the axle housing as shown. See **Special Tools and Equipment**.

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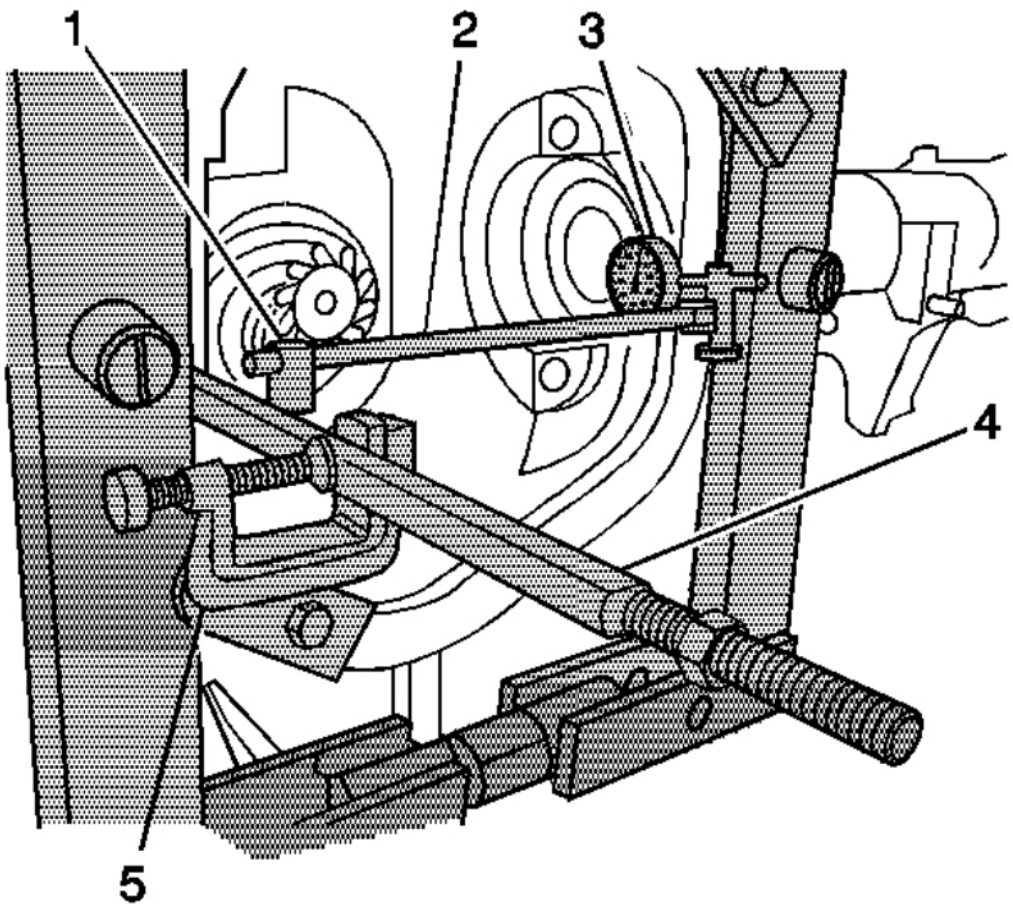


Fig. 197: Installing J 25025-B, J 8001-2, J 34178 & J 8001-4 Onto Axle Housing
Courtesy of GENERAL MOTORS CORP.

6. Preload the dial of the J 8001-3 by pushing the J 8001-3 against the edge of the **J 24385-C** until the needle of the J 8001-3 has moved approximately 3/4 of a turn clockwise.
7. Rotate the indicator housing to align the indicator needle of the J 8001-3 and the dial indicator face to ZERO. See **Special Tools and Equipment**.

NOTE: Do not spread the axle housing more than 0.38 mm (0.015 inch). Overspreading the housing may result in component damage.

8. Spread the axle housing by turning the clevis screw of the **J 24385-C** clockwise while observing the **J 8001** . See **Special Tools and Equipment**.

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Spread the housing just enough to install the differential assembly.

9. Remove the **J 25025-B** , the J 8001-1 , the J 8001-2 , the **J 34178** , the J 8001-3 and the J 8001-4 from the axle housing. See **Special Tools and Equipment**.
10. Install the differential assembly.
11. Remove the **J 24385-C** . See **Special Tools and Equipment**.

IMPORTANT: Corresponding letters are stamped on the bearing caps and axle housing. The bearing caps must be reassembled in the same position as removed.

12. Install the bearing caps.

NOTE: Refer to Fastener Notice in Cautions and Notices.

13. Install the bearing cap bolts.

Tighten: Tighten the bearing cap bolts to 109 N.m (80 lb ft).

14. Install the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
15. Fill the axle with the proper lubricant. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
16. Lower the vehicle.

DIFFERENTIAL REPLACEMENT (10.5 INCH AXLE)

Tools Required

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

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the axle shafts. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
3. Remove the rear axle housing cover. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
4. Remove the differential bearing adjuster nut retainers.

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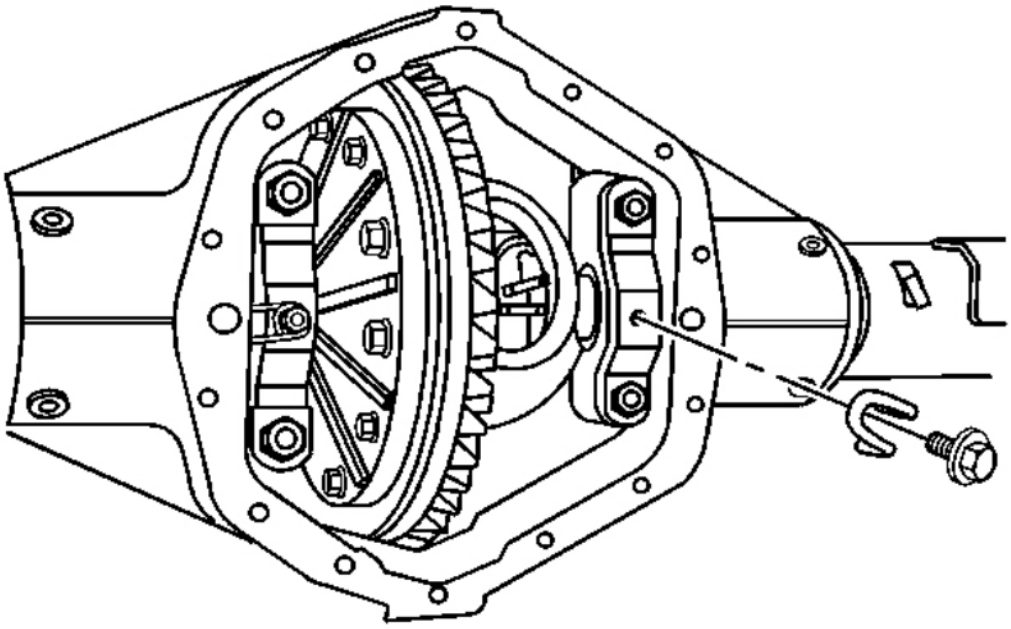


Fig. 198: View Of Differential Bearing Adjuster Nut Lock/Retainer
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Differential Case Removal Caution in Cautions and Notices.

5. Remove the bearing cap bolts.

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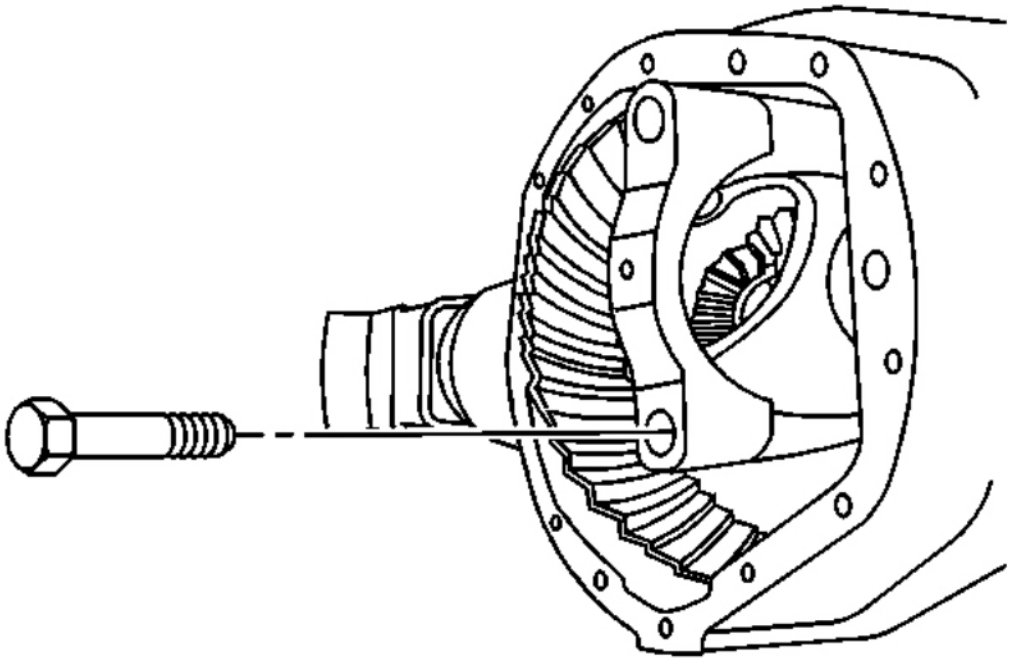


Fig. 199: Removing/Installing Bearing Cap Bolt
Courtesy of GENERAL MOTORS CORP.

6. Remove the bearing caps. Mark the bearing caps left and right.
7. Loosen the adjusters using the **J 24429** . See **Special Tools and Equipment**.

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

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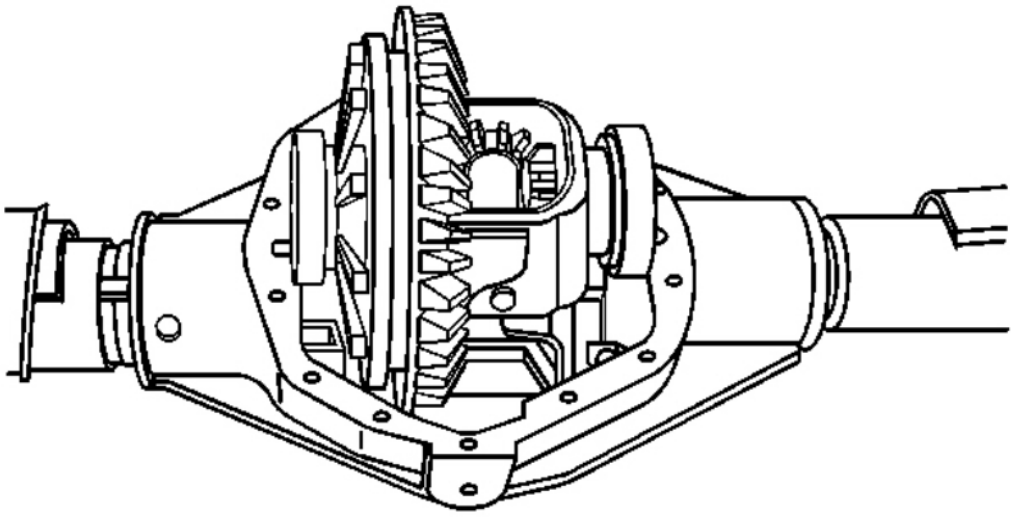


Fig. 200: View Of Differential Case And Axle Housing
Courtesy of GENERAL MOTORS CORP.

8. Remove the differential assembly.
9. Remove the bearing cups.

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

10. Remove the differential side bearings, if necessary. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.
11. Remove the ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.
3. Lubricate the differential side bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
4. Place the case, with the bearing cups installed, into the axle housing.

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

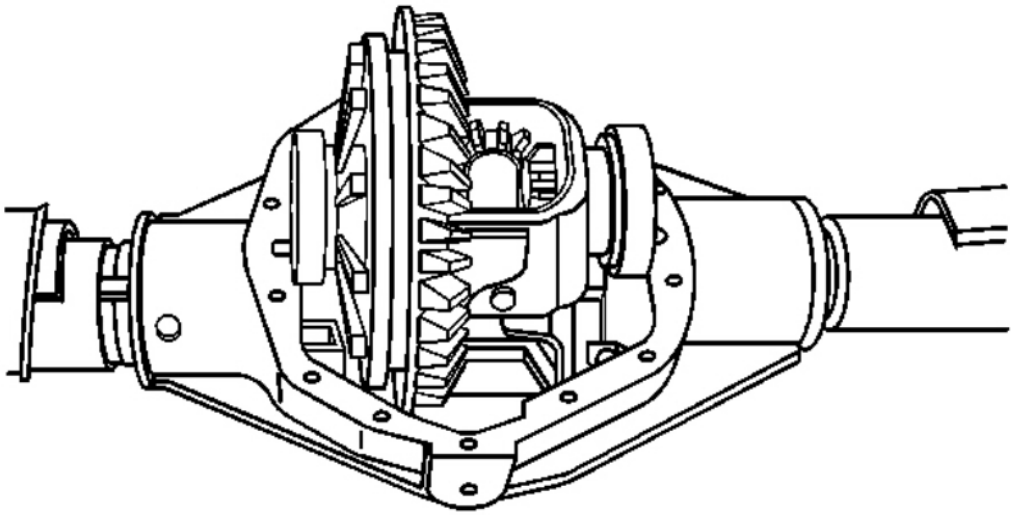


Fig. 201: View Of Differential Case And Axle Housing
Courtesy of GENERAL MOTORS CORP.

5. Install the bearing caps and the bolts.

   Do not torque the bearing cap bolts at this time.

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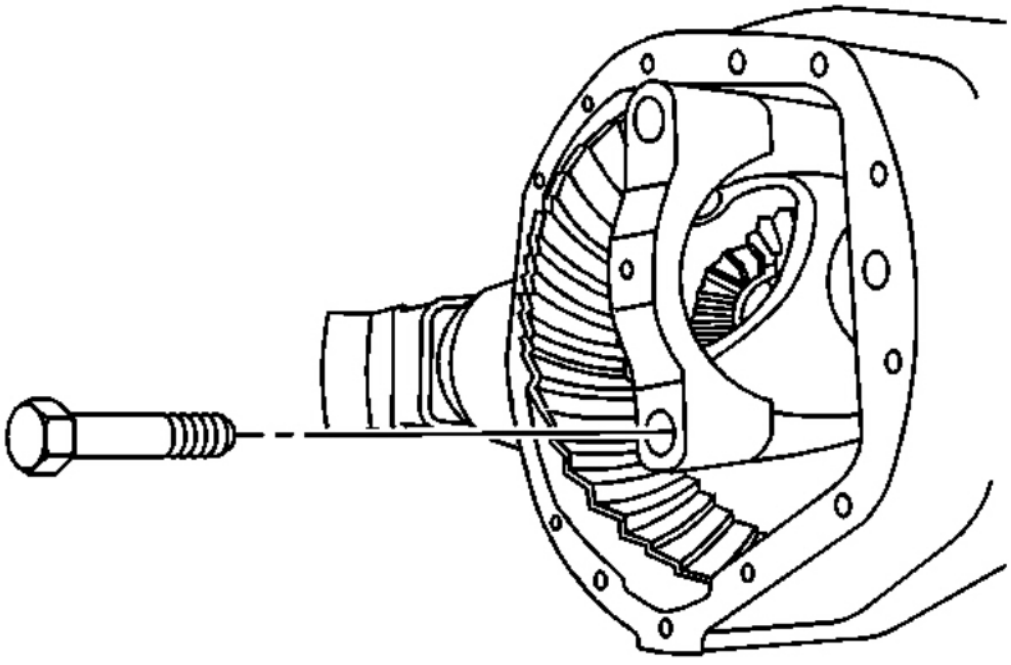


Fig. 202: Removing/Installing Bearing Cap Bolt
Courtesy of GENERAL MOTORS CORP.

6. Turn the adjusters evenly on each side using the **J 24429** until snug against the differential. See **Special Tools and Equipment**.

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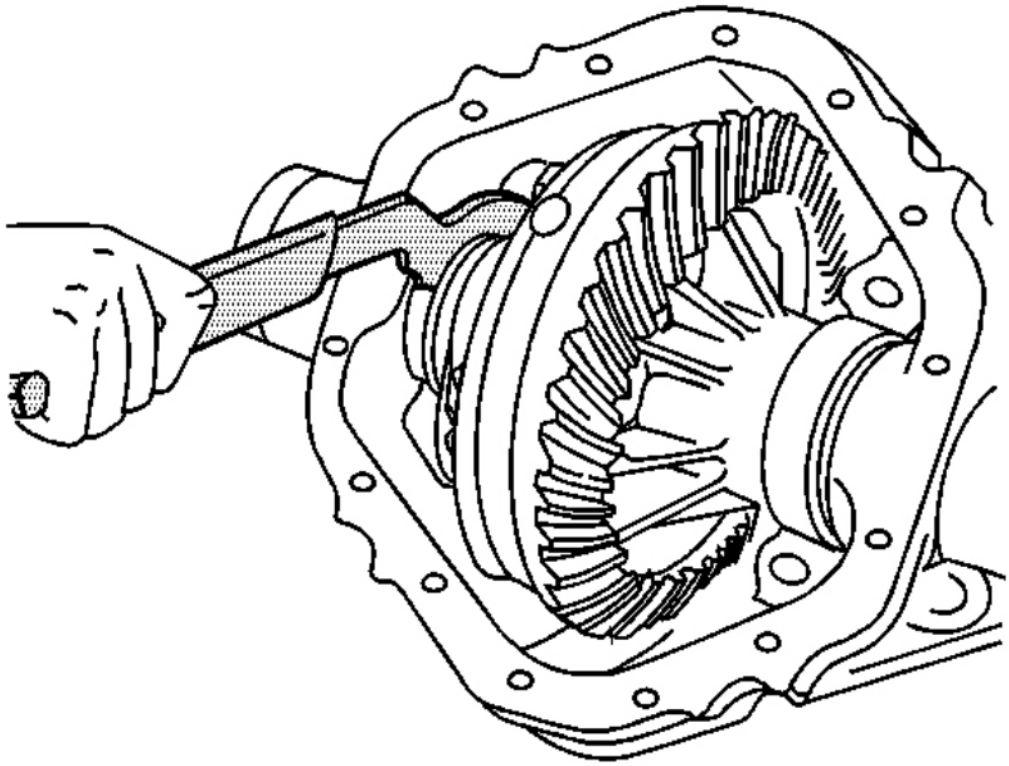


Fig. 203: Turning Adjusters Until Snug Against Differential Using J 24429
Courtesy of GENERAL MOTORS CORP.

7. Adjust the differential side bearing preload. Refer to **Differential Side Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.5 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.75 Inch Axle)** or **Differential Side Bearing Preload Adjustment (10.5 Inch Axle)**.
8. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.
9. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.

NOTE: Refer to Fastener Notice in Cautions and Notices.

10. Tighten the bearing cap bolts.

    Tighten: Tighten the bearing cap bolts to 185 N.m (136 lb ft).

11. Install the axle shafts. Refer to **Rear Axle Shaft and/or Gasket Replacement**.

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12. Install the rear axle housing cover. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
13. Fill the axle with the proper lubricant. Refer to **Capacities - Approximate Fluid** and **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
14. Lower the vehicle.

DIFFERENTIAL SIDE BEARINGS REPLACEMENT (ALL EXCEPT 9.75 INCH AXLE)

Tools Required

- **J 8092** Universal Driver Handle - 3/4 in - 10. See **Special Tools and Equipment**.
- **J 21784** Side Bearing Installer
- **J 22888-D** Side Bearing Remover Kit
- **J 29710** Differential Side Bearing Installer
- **J 36597** Side Bearing Puller Pilot - 9.25 inch

Removal Procedure

1. Remove the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
2. Remove the differential side bearings by performing the following steps:
    1. For the 8.6 inch and the 9.5 inch axles, install the differential assembly in a vise.
    2. For the 10.5 inch axle, 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.

    3. Install the J 22888-20A (2) and the J 8107-4 , 8.6 inch axle, or the **J 36597** , 9.5 inch or 10.5 inch axles as shown.
    4. Remove the differential side bearings using the J 22888-20A .

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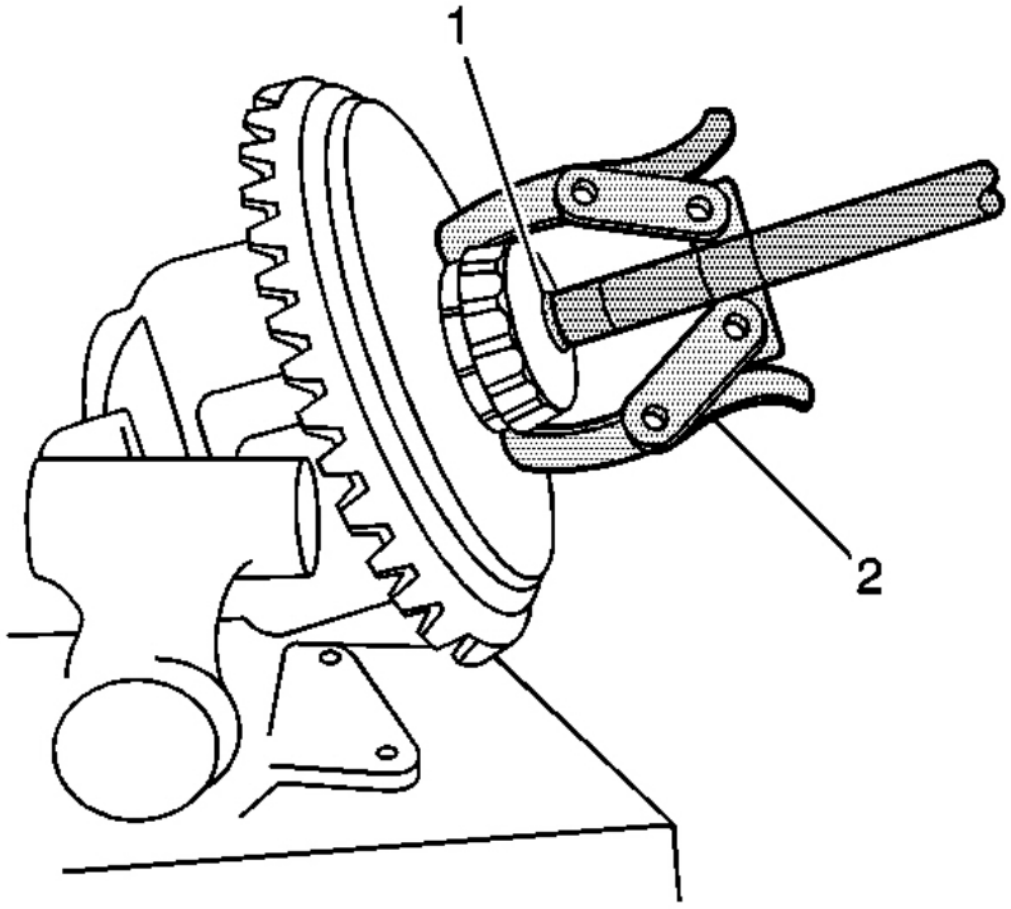


Fig. 204: Removing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

3. Remove the differential assembly from the vise.

Installation Procedure

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

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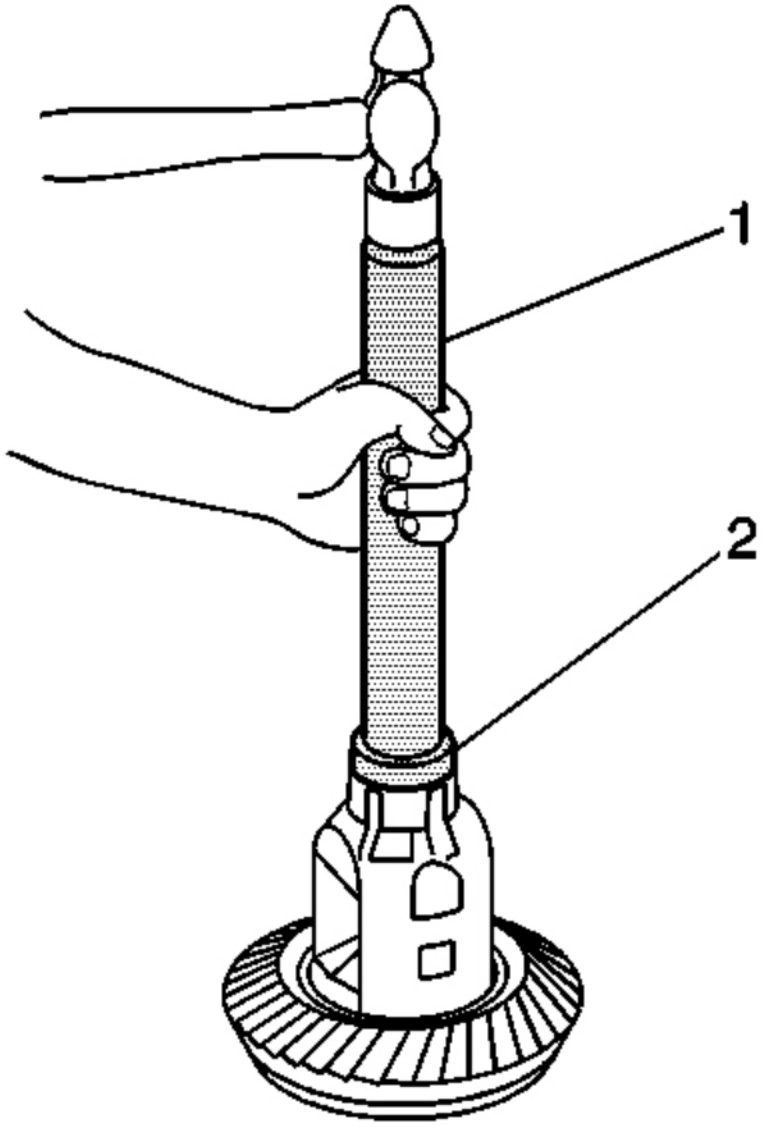


Fig. 205: Driving The Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS CORP.

2. Install the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.

DIFFERENTIAL SIDE BEARINGS REPLACEMENT (9.75 INCH AXLE)

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Tools Required

- **J 22888-D** Side Bearing Remover Kit. See **Special Tools and Equipment**.
- **J 24430** Differential Side Bearing Installer
- **J 36597** Side Bearing Puller Pilot - 9.25 inch
- **J 45711** Differential Side Bearing Remover - Dana 248
- **J 45900** Differential Side Bearing Installer - Dana Axles
- **J 8092** Universal Driver Handle - 3/4 in - 10

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
3. Remove the differential side bearing by performing the following steps:
    1. Install the **J 45711** (2) and the **J 36597** (1) as shown. See **Special Tools and Equipment**.
    2. Remove the differential side bearing using the **J 45711** and a hydraulic press. See **Special Tools and Equipment**.

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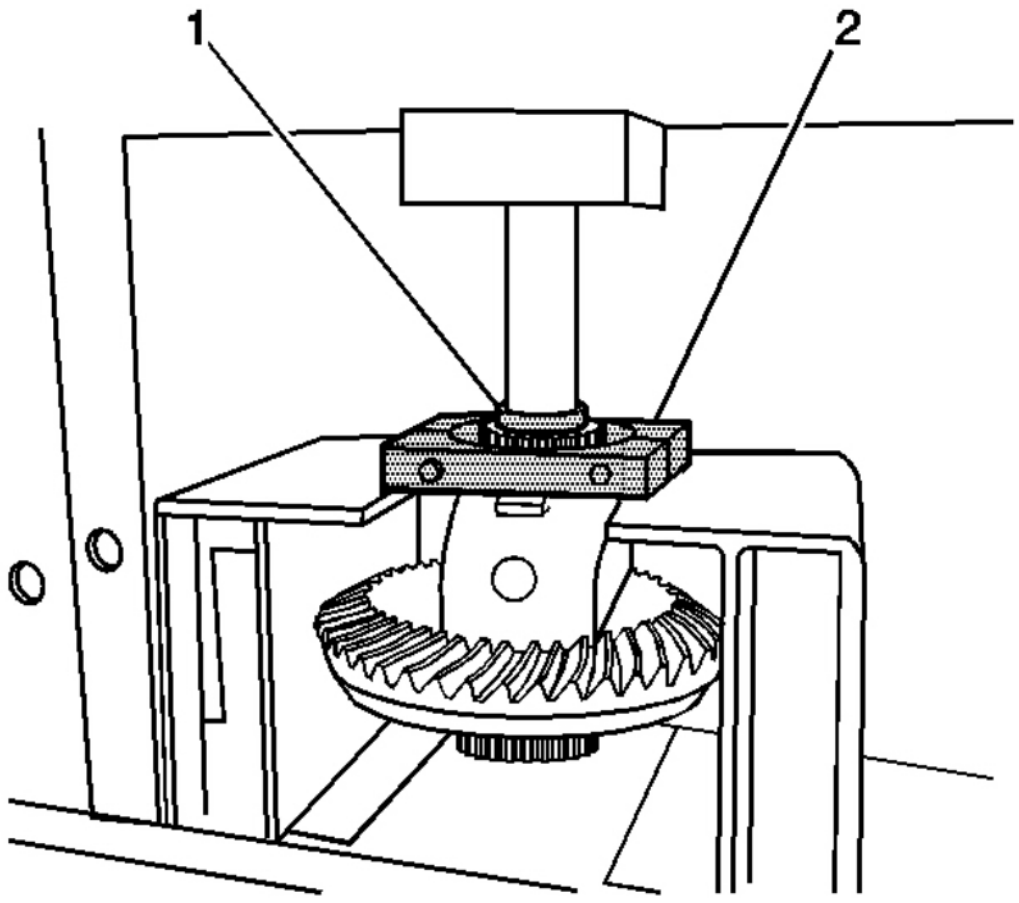


Fig. 206: Removing Differential Side Bearings Using J 45711 & J 36597
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Mark the inboard shims left or right.

4. Remove the inboard shims.

Installation Procedure

1. Determine the shim thickness and preload for the differential assembly. Refer to **Differential Side Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.5 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.75 Inch Axle)** or **Differential Side Bearing Preload Adjustment (10.5 Inch Axle)**.
2. Install the differential side bearing by doing the following:

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1. In order to protect the differential case, install the J 8107-3 in the case on the side opposite of the bearing installation.
2. Install the inboard shims.
3. Install the differential side bearing.
4. Install the **J 24430** or the **J 45900** (2) and the **J 8092** (1) over the differential side bearing. See **Special Tools and Equipment**.
5. Drive the differential side bearing into position using the **J 24430** or the **J 45900** and the **J 8092** . See **Special Tools and Equipment**.
6. Install the differential assembly. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.

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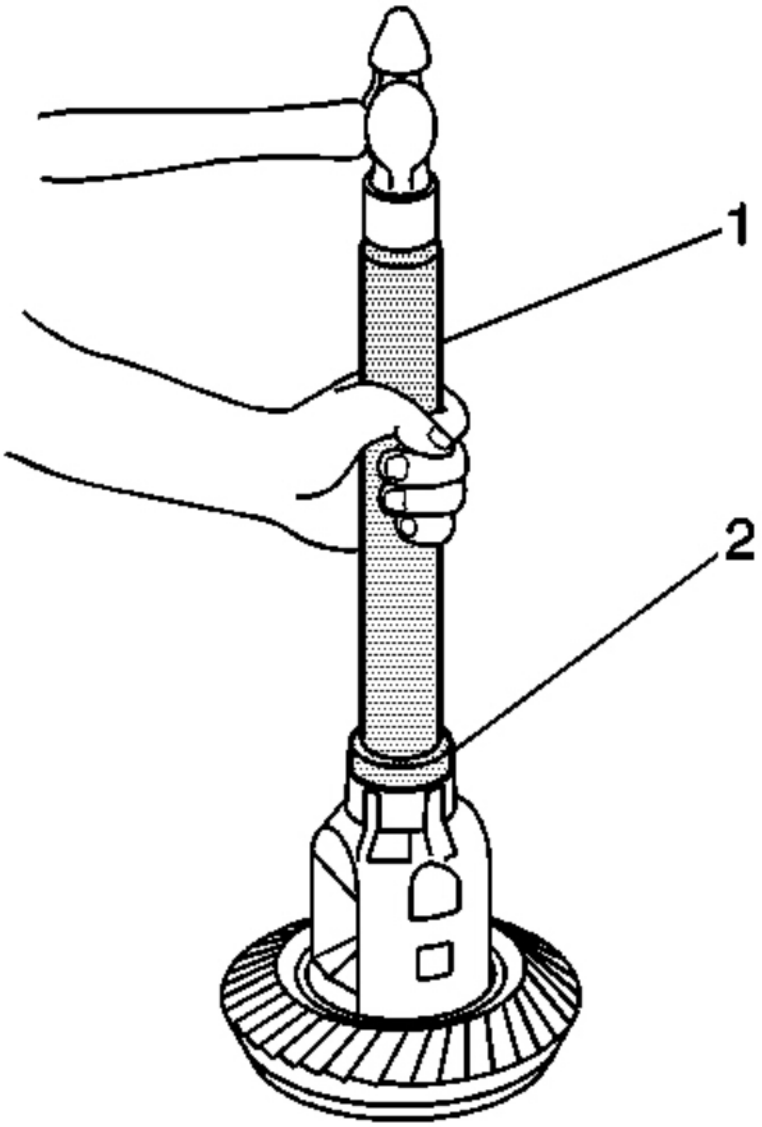


Fig. 207: Driving The Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS CORP.

3. Fill the axle with lubricant. Use the proper fluid. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
4. Lower the vehicle.

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REAR AXLE REPLACEMENT (15 SERIES)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Place jack stands or utility stands, such as GMDE 123-B67313, at the front-end of the vehicle.
3. Support the rear axle with jack stands.
4. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
5. Disconnect the rear axle vent tube.
6. Remove the propshaft. Refer to **Propeller Shaft Replacement - Rear** in Propeller Shaft.
7. Disconnect the left-rear park brake cable from the rear axle. Refer to **Park Brake Cable Replacement - Left Rear (without RPO NYS)** or **Park Brake Cable Replacement - Left Rear (with RPO NYS)** in Park Brake.
8. Disconnect the right-rear park brake cable from the rear axle. Refer to **Park Brake Cable Replacement - Right Rear (without RPO NYS)** or **Park Brake Cable Replacement - Right Rear (with RPO NYS)** in Park Brake.
9. Remove the caliper assemblies from the rear axle. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
10. Remove the stabilizer shaft from the rear axle. Refer to **Stabilizer Shaft Replacement (15/25 Series)** in Rear Suspension.
11. Remove the crossover brake pipe from the rear axle.
12. Remove the coil springs. Refer to **Coil Spring Replacement** in Rear Suspension.
13. Disconnect the track bar from the rear axle. Refer to **Track Bar Replacement** in Rear Suspension.
14. Disconnect the lower control arm from the rear axle. Refer to **Rear Axle Lower Control Arm Replacement** in Rear Suspension.
15. Disconnect the upper control arm from the rear axle. Refer to **Rear Axle Upper Control Arm Replacement** in Rear Suspension.
16. Remove the rear-axle assembly from the vehicle.

Installation Procedure

1. Install the rear-axle assembly to the vehicle.
2. Connect the upper control arm to the rear axle. Refer to **Rear Axle Upper Control Arm Replacement** in Rear Suspension.
3. Connect the lower control arm to the rear axle. Refer to **Rear Axle Lower Control Arm Replacement** in Rear Suspension.
4. Connect the track bar to the rear axle. Refer to **Track Bar Replacement** in Rear Suspension.
5. Install the coil springs. Refer to **Coil Spring Replacement** in Rear Suspension.

NOTE: **Refer to Fastener Notice in Cautions and Notices.**

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6. Install the crossover brake pipe to the rear axle.

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

7. Install the stabilizer shaft to the rear axle. Refer to **Stabilizer Shaft Replacement (15/25 Series)** in Rear Suspension.
8. Install the caliper assemblies to the rear axle. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
9. Connect the right-rear park brake cable to the rear axle. Refer to **Park Brake Cable Replacement - Right Rear (without RPO NYS)** or **Park Brake Cable Replacement - Right Rear (with RPO NYS)** in Park Brake.
10. Connect the left-rear park brake cable to the rear axle. Refer to **Park Brake Cable Replacement - Left Rear (without RPO NYS)** or **Park Brake Cable Replacement - Left Rear (with RPO NYS)** in Park Brake.
11. Install the propshaft. Refer to **Propeller Shaft Replacement - Rear** in Propeller Shaft.
12. Connect the rear axle vent tube.
13. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
14. Fill the axle with lubricant. Use the proper fluid. Refer to **Capacities - Approximate Fluid** and to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
15. Remove the utility stands and the jack stands.
16. Lower the vehicle.

REAR AXLE REPLACEMENT (25 SERIES)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
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 **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
4. Disconnect the propeller shaft. Refer to **Propeller Shaft Replacement - Rear** .
5. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
6. Disconnect the parking brake cable. Refer to **Park Brake Cable Replacement - Left Rear (without RPO NYS)** or **Park Brake Cable Replacement - Left Rear (with RPO NYS)** and **Park Brake Cable Replacement - Right Rear (without RPO NYS)** or **Park Brake Cable Replacement - Right Rear (with RPO NYS)** in Park Brake.
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 **Brake Caliper Replacement**

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- Rear (1500 Series) or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.

9. Disconnect the shock absorbers from the axle brackets. Refer to **Shock Absorber Replacement (15 Series)** or **Shock Absorber Replacement (25 Series)** in Rear Suspension.
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.

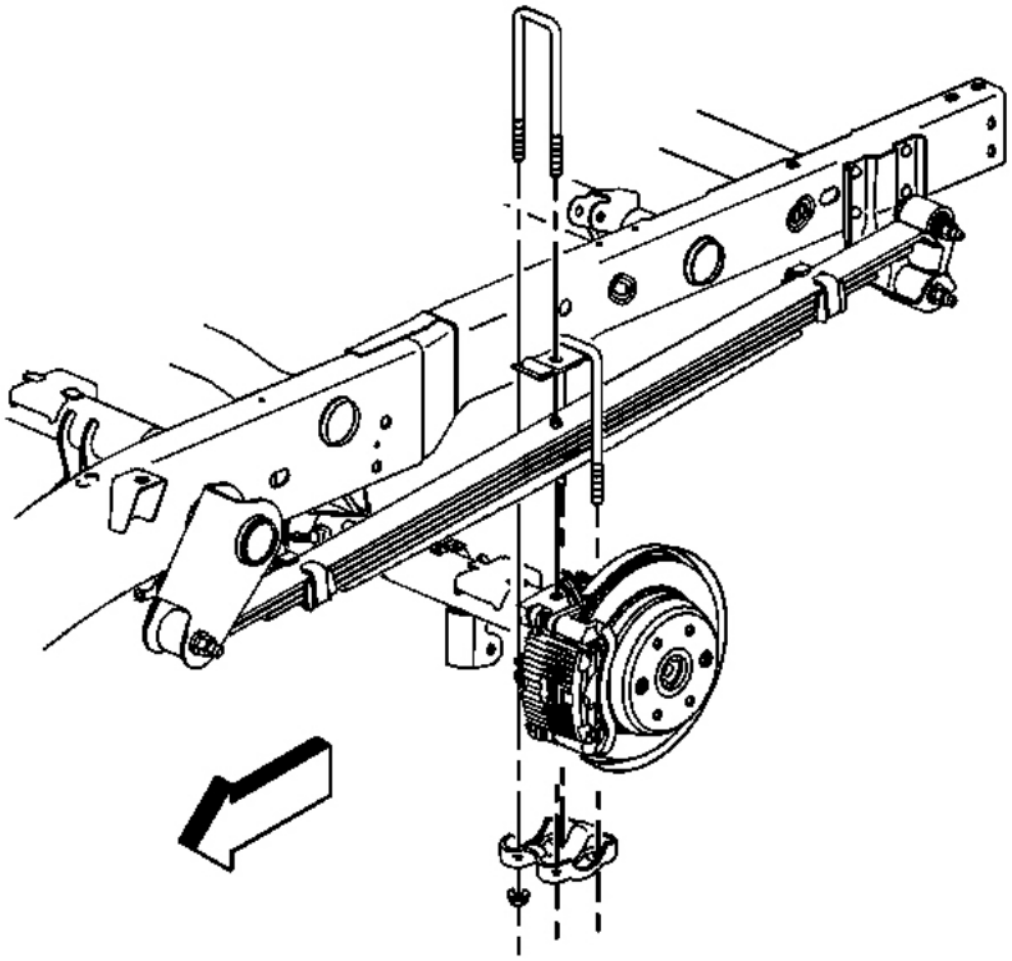


Fig. 208: Identifying U-Bolts
Courtesy of GENERAL MOTORS CORP.

13. Lower the axle assembly.

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Installation Procedure

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 in Cautions and Notices.

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

Tighten:

- For 25 Series Utilities without 8.1 L Engine, tighten the nuts to 72 N.m (53 lb ft).
- For 25 Series Utilities with 8.1 L Engine, tighten the nuts to 150 N.m (110 lb ft).

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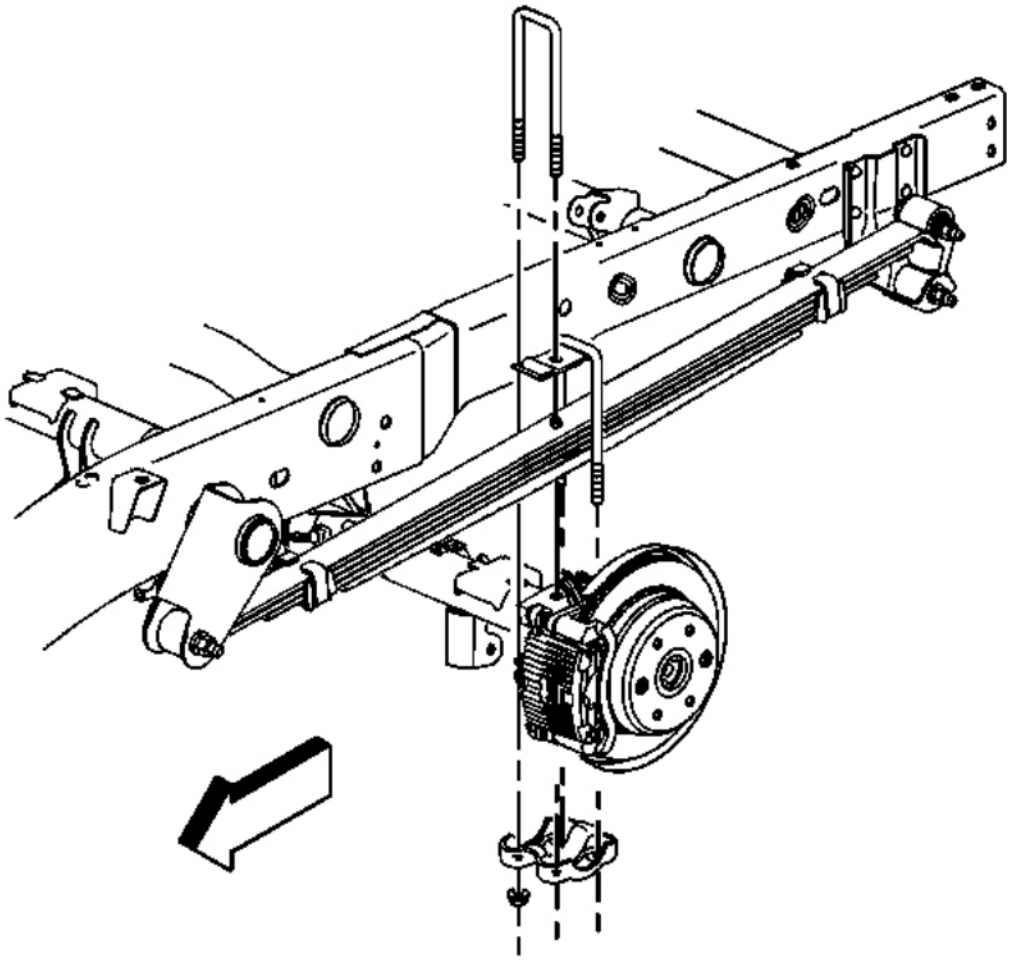


Fig. 209: Identifying U-Bolts
Courtesy of GENERAL MOTORS CORP.

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 (15 Series)** or **Shock Absorber Replacement (25 Series)** in Rear Suspension.
8. Install the brake calipers. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
9. Install the brake lines and the brake line bracket bolts to the axle.
10. Connect the parking brake cable. Refer to **Park Brake Cable Replacement - Left Rear (without RPO NYS)** or **Park Brake Cable Replacement - Left Rear (with RPO NYS)** and **Park Brake Cable Replacement - Right Rear (without RPO NYS)** or **Park Brake Cable Replacement - Right Rear**

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(with RPO NYS) in Park Brake.

11. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
12. Connect the propeller shaft. Refer to **Propeller Shaft Replacement - Rear** in Propeller Shaft.
13. Fill the axle with lubricant. Use the proper fluid. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
14. Remove the utility stands.
15. Lower the vehicle.

REAR AXLE REPLACEMENT (25 SERIES W/ RPO NYS)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Place jack stands at the front end of the vehicle in order to support the weight difference when the rear axle is removed.
3. Drain the axle lubricant from the rear axle. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
4. Remove the propeller shaft. Refer to **Propeller Shaft Replacement - Rear** in Propeller Shaft.
5. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
6. Disconnect the parking brake cables. Refer to **Park Brake Cable Replacement - Left Rear (without RPO NYS)** or **Park Brake Cable Replacement - Left Rear (with RPO NYS)** and **Park Brake Cable Replacement - Right Rear (without RPO NYS)** or **Park Brake Cable Replacement - Right Rear (with RPO NYS)** in Park Brake.
7. Remove the left and right brake calipers from the brake caliper mounting brackets. Do not disconnect the hydraulic brake lines from the brake calipers. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes. Secure the left and the right brake calipers with mechanics wire to the leaf spring or the frame assembly.

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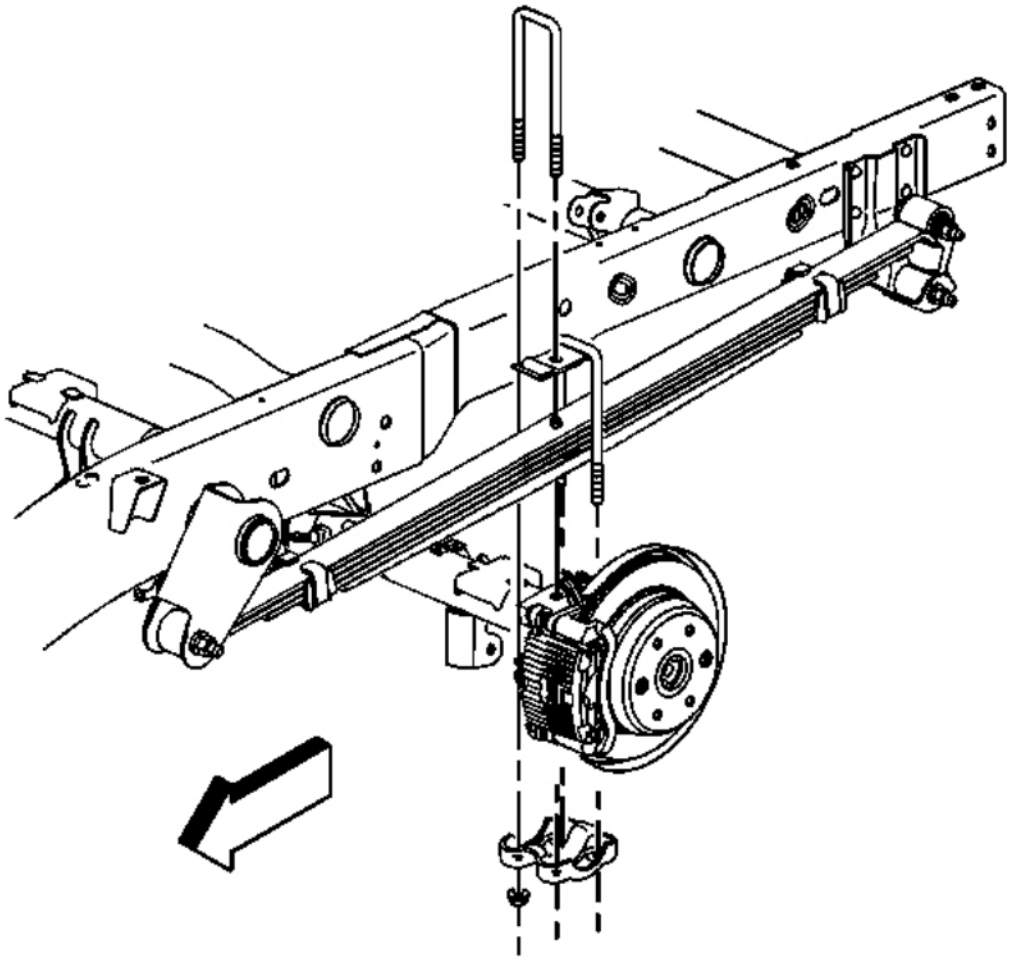


Fig. 210: Identifying U-Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the 2 flex hose bracket bolts (1).
9. Remove the 2 brake pipe bracket bolts (2).
10. Remove the jounce bracket bolt (3).
11. Remove the brake pipe bracket nut (4). Secure the rear brake pipe assembly with mechanics wire to the under body and frame. Do not bend or kink the brake pipe assembly.

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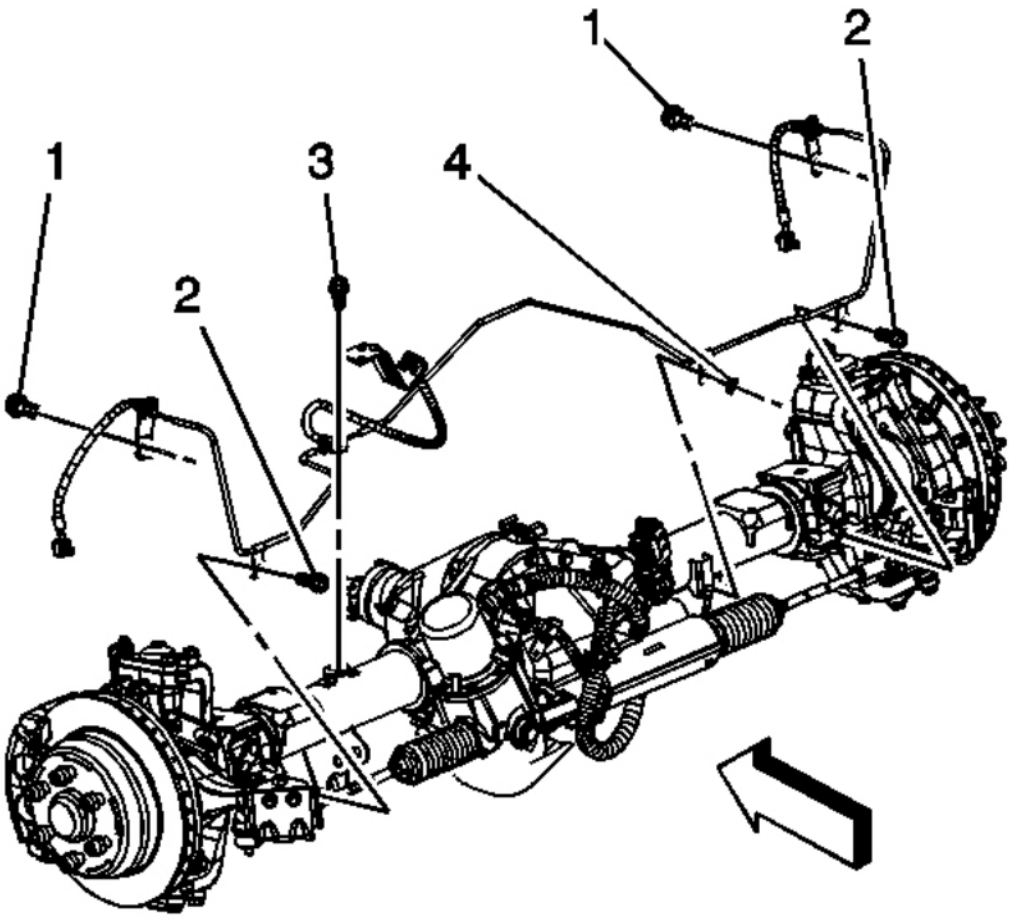


Fig. 211: View Of Flex Hose Bracket Bolts, Brake Pipe Bracket Bolts, Jounce Bracket Bolt & Brake Pipe Bracket Nut
Courtesy of GENERAL MOTORS CORP.

12. Disconnect the shock absorbers from the axle brackets. Refer to **Shock Absorber Replacement (15 Series)** or **Shock Absorber Replacement (25 Series)** in Rear Suspension.
13. Remove the vent hose from the rear axle vent fitting. Refer to **Vent Hose Replacement**.
14. Support the rear axle assembly with a suitable jack. Remove the nuts and the washers if equipped from the U-bolts.
15. Remove the U-bolts, the spring plates and the spacers from the axle assembly.
16. Lower the axle assembly.

Installation Procedure

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1. Place the axle assembly onto the jack and place the rear axle assembly under the vehicle.
2. Align the rear axle assembly with the springs. Using the jack slowly raise the rear axle assembly into position.
3. Connect the spacers, the spring plates and the U-bolts to the rear axle.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. 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).

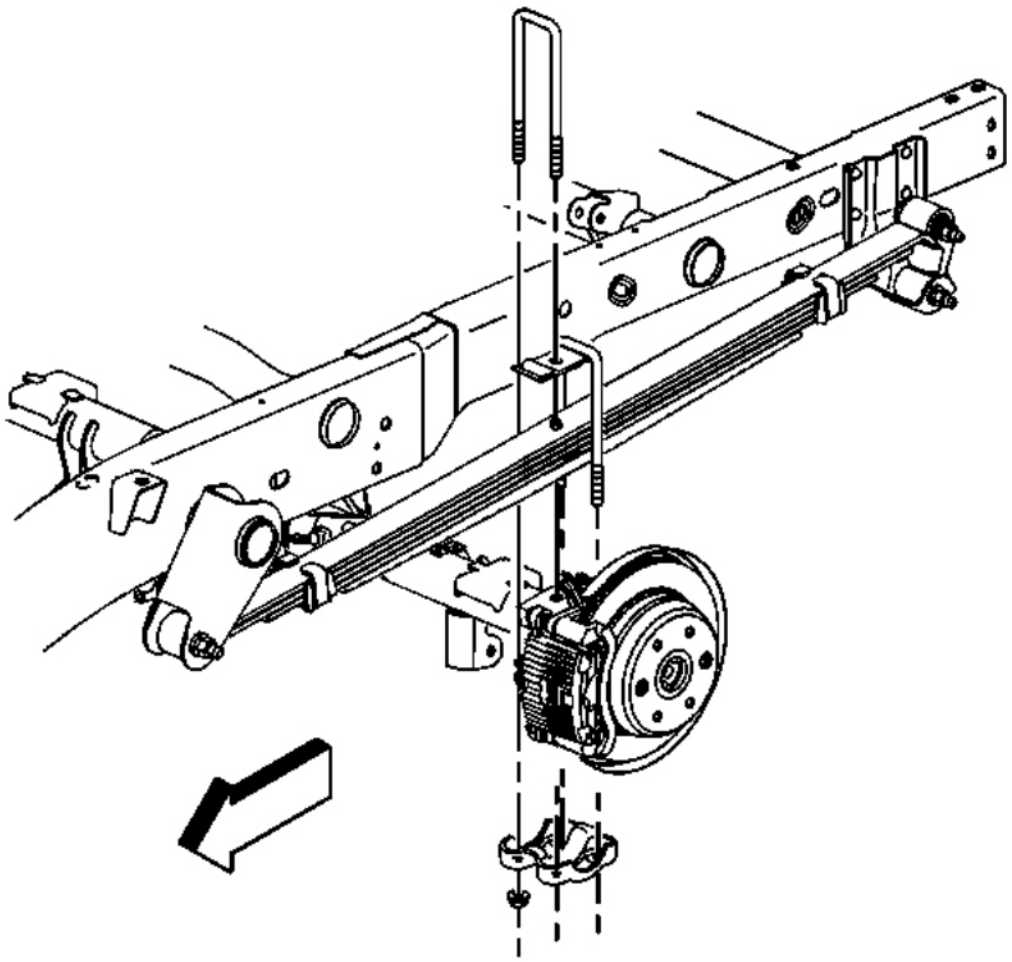


Fig. 212: Identifying U-Bolts

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5. Install the vent hose to the rear axle vent fitting. Refer to **Vent Hose Replacement**.
6. Connect the shock absorbers to the rear axle. Refer to **Shock Absorber Replacement (15 Series)** or **Shock Absorber Replacement (25 Series)** in Rear Suspension.
7. Remove the mechanics wire supporting the brake pipe assembly. Carefully position the brake pipe assembly onto the rear axle.
8. Install the brake pipe bracket nut (4).

   Tighten: Tighten the nut to 13 N.m (115 lb in).

9. Install the jounce bracket bolt (3).

   Tighten: Tighten the bolt to 12 N.m (106 lb in).

10. Install the 2 brake pipe bracket bolts (2).

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

11. Install the 2 flex hose bracket bolts (1).

    Tighten: Tighten the bolts to 12 N.m (106 lb in).

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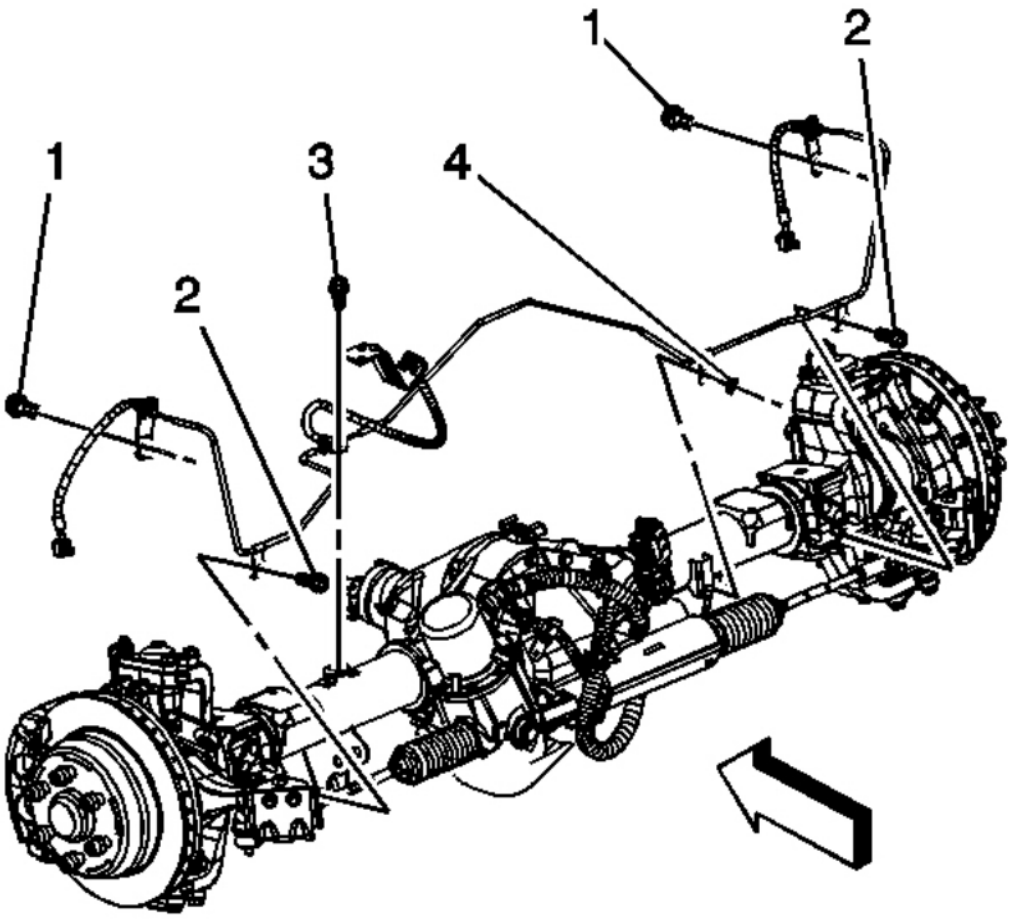


Fig. 213: View Of Flex Hose Bracket Bolts, Brake Pipe Bracket Bolts, Jounce Bracket Bolt & Brake Pipe Bracket Nut
Courtesy of GENERAL MOTORS CORP.

12. Remove the mechanics wire securing the brake calipers and install the brake calipers to the brake caliper mounting brackets. Refer to **Brake Caliper Replacement - Rear (1500 Series)** or **Brake Caliper Replacement - Rear (2500 Series)** in Disc Brakes.
13. Connect the parking brake cable. Refer to **Park Brake Cable Replacement - Left Rear (without RPO NYS)** or **Park Brake Cable Replacement - Left Rear (with RPO NYS)** and **Park Brake Cable Replacement - Right Rear (without RPO NYS)** or **Park Brake Cable Replacement - Right Rear (with RPO NYS)** in Park Brake.
14. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
15. Connect the propeller shaft. Refer to **Propeller Shaft Replacement - Rear** in Propeller Shaft.

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16. Fill the axle with lubricant. Use the proper fluid. Refer to **Capacities - Approximate Fluid** and **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
17. Remove the jack stands.
18. Lower the vehicle.

REAR AXLE HOUSING REPLACEMENT (ALL EXCEPT 9.75 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the axle lubricant. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
3. Remove the rear axle assembly. Refer to **Rear Axle Replacement (15 Series)** or **Rear Axle Replacement (25 Series)** or **Rear Axle Replacement (25 Series w/ RPO NYS)**.
4. Remove the brake caliper brackets. Refer to **Brake Caliper Bracket Replacement - Rear (W/O NYS)** or **Brake Caliper Bracket Replacement - Rear (W/NYS)** in Disc Brakes.
5. Remove the wheel hub. Refer to **Rear Axle Hub, Bearing, Cup, and/or Seal Replacement** (10.5 inch axles only).
6. Remove the rear axle cover housing and gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
7. Remove the brake backing plates. Refer to **Disc Brake Backing Plate Replacement - Rear (W/O NYS)** or **Disc Brake Backing Plate Replacement - Rear (15 Series W/NYS)** .
8. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)** (8.6 inch, 9.5 inch axles) or **Rear Axle Shaft and/or Gasket Replacement** (10.5 inch axles).
9. Remove the differential. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
10. Remove the drive pinion. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
11. Remove the drive pinion shaft yoke and the 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 (9.75 Inch Axle)**.

Installation Procedure

1. Install the drive pinion. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
2. Install the differential case. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

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3. Adjust the side bearing preload. Refer to **Differential Side Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.5 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.75 Inch Axle)** or **Differential Side Bearing Preload Adjustment (10.5 Inch Axle)**.
4. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.
5. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.
6. Install the brake backing plates. Refer to **Disc Brake Backing Plate Replacement - Rear (W/O NYS)** or **Disc Brake Backing Plate Replacement - Rear (15 Series W/NYS)** .
7. Install the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)** (8.6 inch, 9.5 inch axles) or **Rear Axle Shaft and/or Gasket Replacement** (10.5 inch axles).
8. Install the rear axle housing cover and gasket. Refer to **Rear Axle Housing Cover and Gasket Replacement**.
9. Install the brake caliper brackets. Refer to **Brake Caliper Bracket Replacement - Rear (W/O NYS)** or **Brake Caliper Bracket Replacement - Rear (W/NYS)** in Disc Brakes.
10. Install the wheel hub. Refer to **Rear Axle Hub, Bearing, Cup, and/or Seal Replacement** (10.5 inch axles only).
11. Install the rear axle. Refer to **Rear Axle Replacement (15 Series)** or **Rear Axle Replacement (25 Series)** or **Rear Axle Replacement (25 Series w/ RPO NYS)**.
12. Fill the axle with lubricant. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
13. Lower the vehicle.

REAR AXLE HOUSING REPLACEMENT (9.75 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the steering gear protection shield. Refer to **Steering Gear Protection Shield Replacement** in Rear Wheel Steering.
3. Remove the axle lubricant. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.75 Inch Axle)**.
4. Remove the rear axle assembly. Refer to **Rear Axle Replacement (15 Series)** or **Rear Axle Replacement (25 Series)** or **Rear Axle Replacement (25 Series w/ RPO NYS)**.
5. Remove the steering knuckles. Refer to **Steering Knuckle Replacement** in Rear Wheel Steering.
6. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
7. Remove the differential. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear**

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Replacement (10.5 Inch Axle).

8. Remove the drive pinion shaft yoke and the 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 (9.75 Inch Axle)**.
9. Remove the drive pinion and the outer pinion bearing. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
10. Remove the pinion bearing cups. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 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 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
2. Install the drive pinion outer pinion bearing and the 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 (9.75 Inch Axle)**.
3. Install the drive pinion. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
4. 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 (9.75 Inch Axle)**.
5. Install the differential case. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
6. Adjust the side bearing preload. Refer to **Differential Side Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.5 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.75 Inch Axle)** or **Differential Side Bearing Preload Adjustment (10.5 Inch Axle)**.
7. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.
8. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.
9. Install the axle shafts. Refer to **Rear Axle Shaft Replacement (8.6 Inch Axle W/O JL4, 9.5 Inch Axle)** or **Rear Axle Shaft Replacement (8.6 Inch Axle W/JL4)** or **Rear Axle Shaft Replacement (9.75 Inch Axle)**.
10. Install the steering knuckles. Refer to **Steering Knuckle Replacement** in Rear Wheel Steering.
11. Install the rear axle. Refer to **Rear Axle Replacement (15 Series)** or **Rear Axle Replacement (25 Series)** or **Rear Axle Replacement (25 Series w/ RPO NYS)**.
12. Install the steering gear protection shield. Refer to **Steering Gear Protection Shield Replacement** in Rear Wheel Steering.
13. Fill the axle with lubricant. Refer to **Lubricant Replacement - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Replacement - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Replacement - Rear**

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Drive Axle (9.75 Inch Axle).

14. Lower the vehicle.

DIFFERENTIAL OVERHAUL (9.5 INCH AXLE)

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

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.
    3. Remove the differential side bearings using the J 22888-20A .

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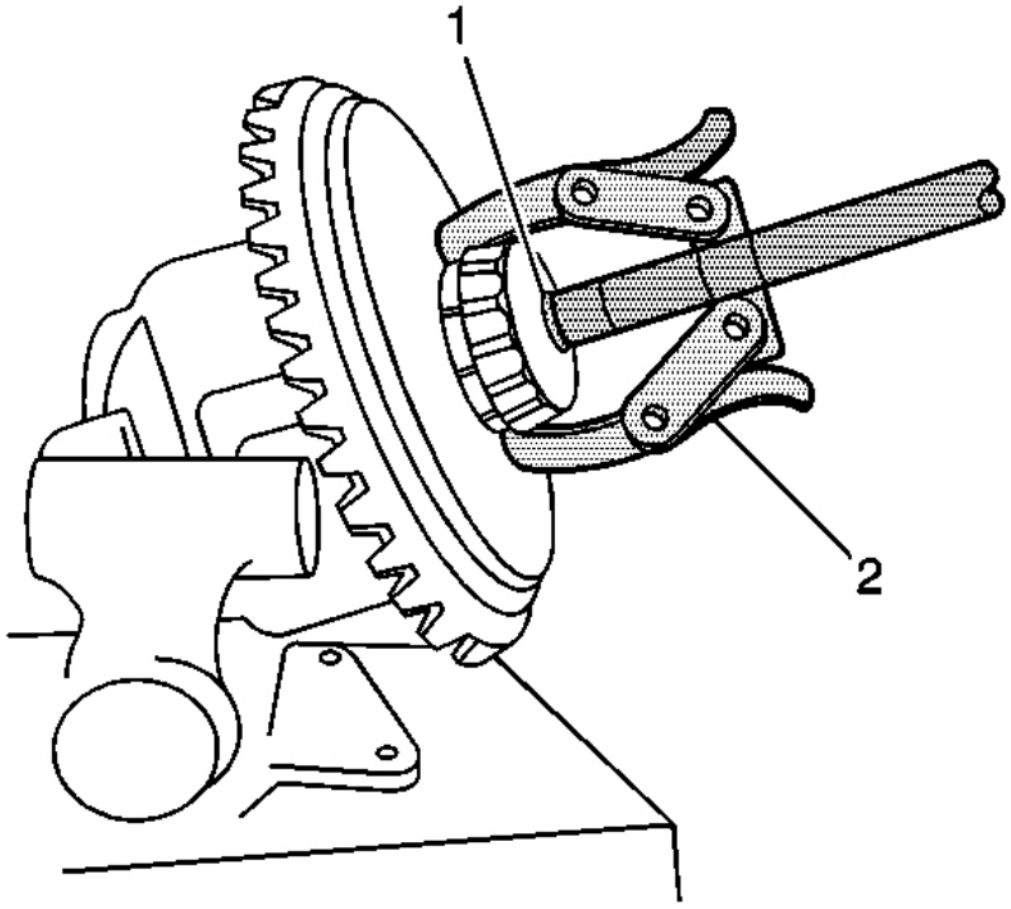


Fig. 214: Removing Differential Side Bearing
Courtesy of GENERAL MOTORS CORP.

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

2. Remove the gear bolts. Discard the bolts.

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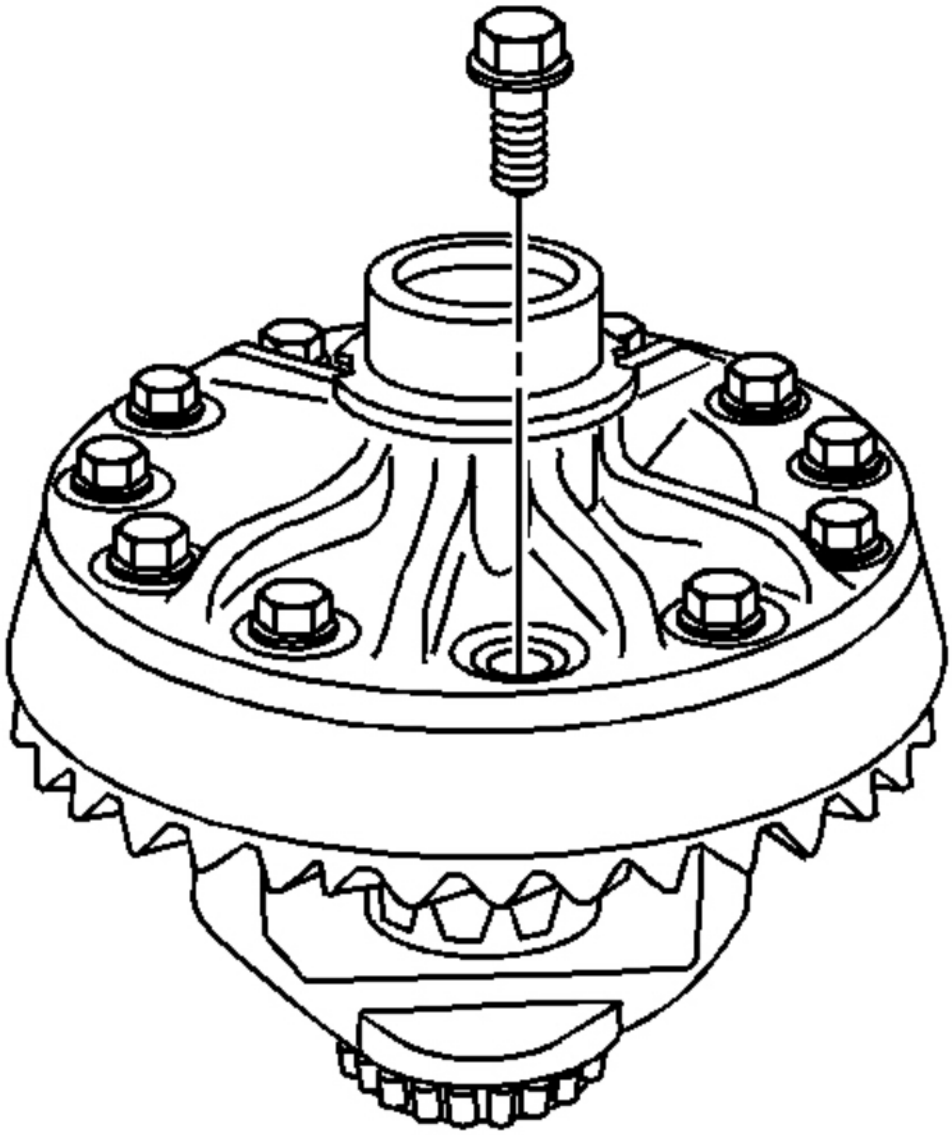


Fig. 215: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Ring Gear Removal Notice in Cautions and Notices.

3. Remove the ring gear from the differential case.

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

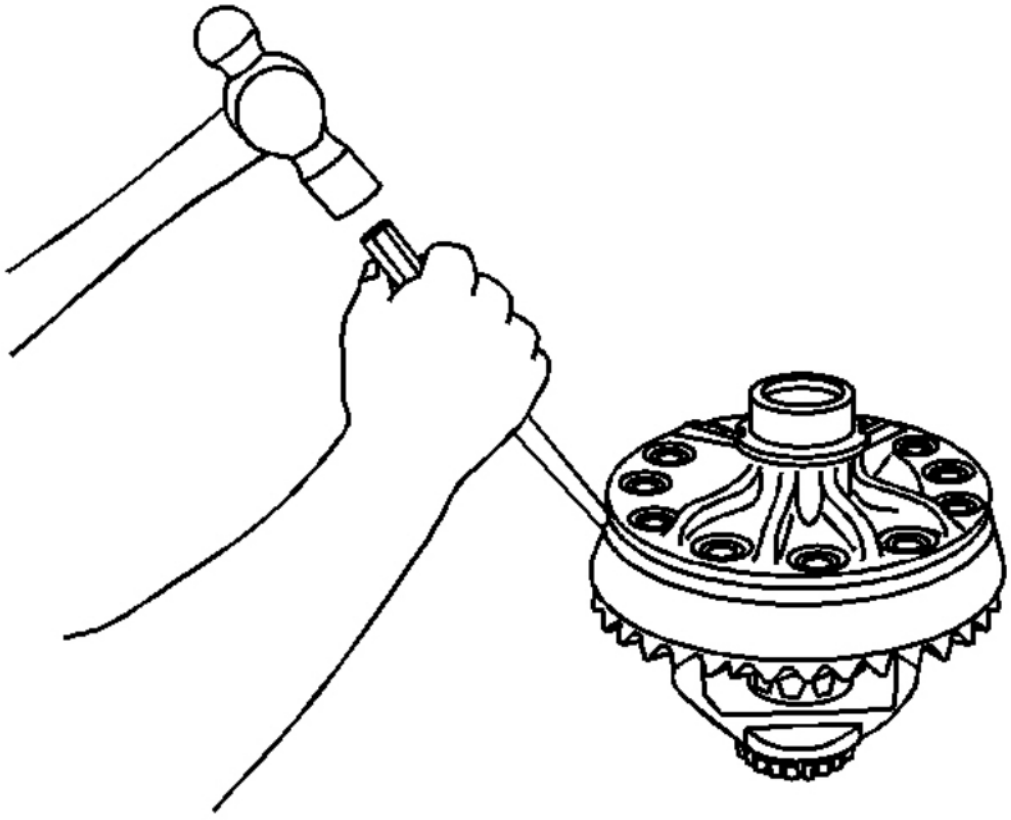


Fig. 216: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

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.

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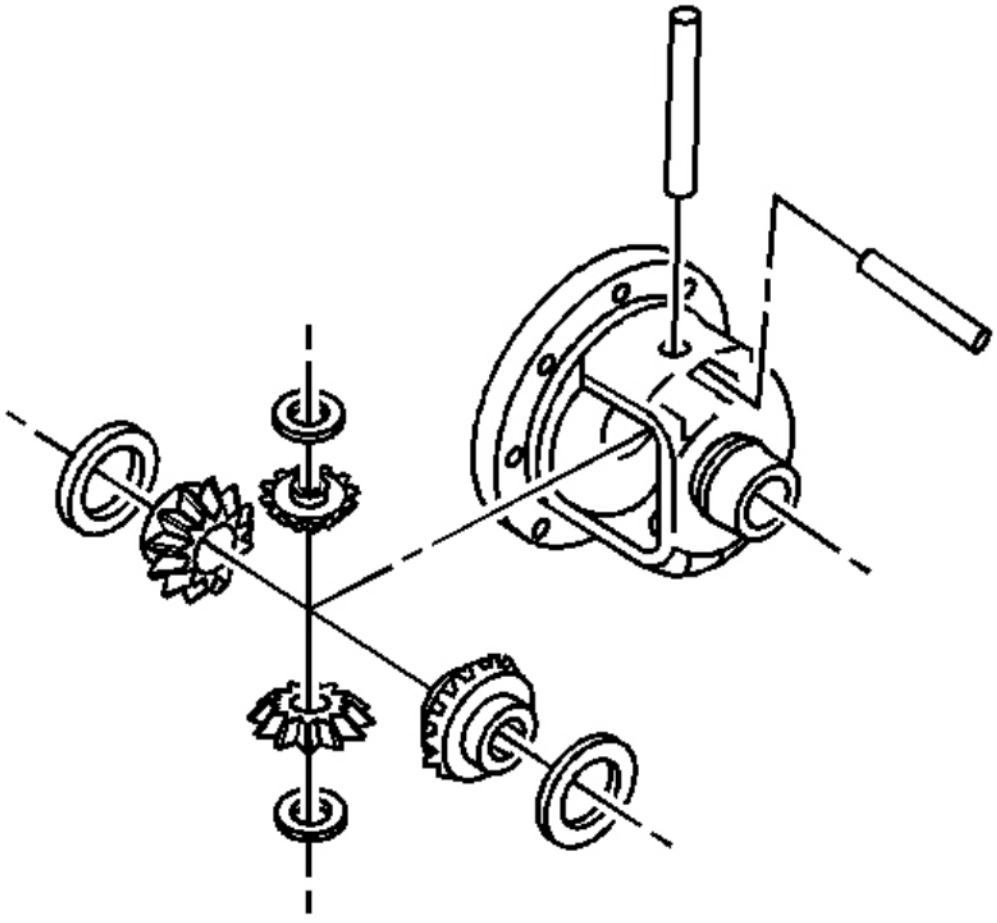


Fig. 217: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

Assembly Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
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.

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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 in Cautions and Notices.

6. Install a new pinion shaft lock bolt.

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

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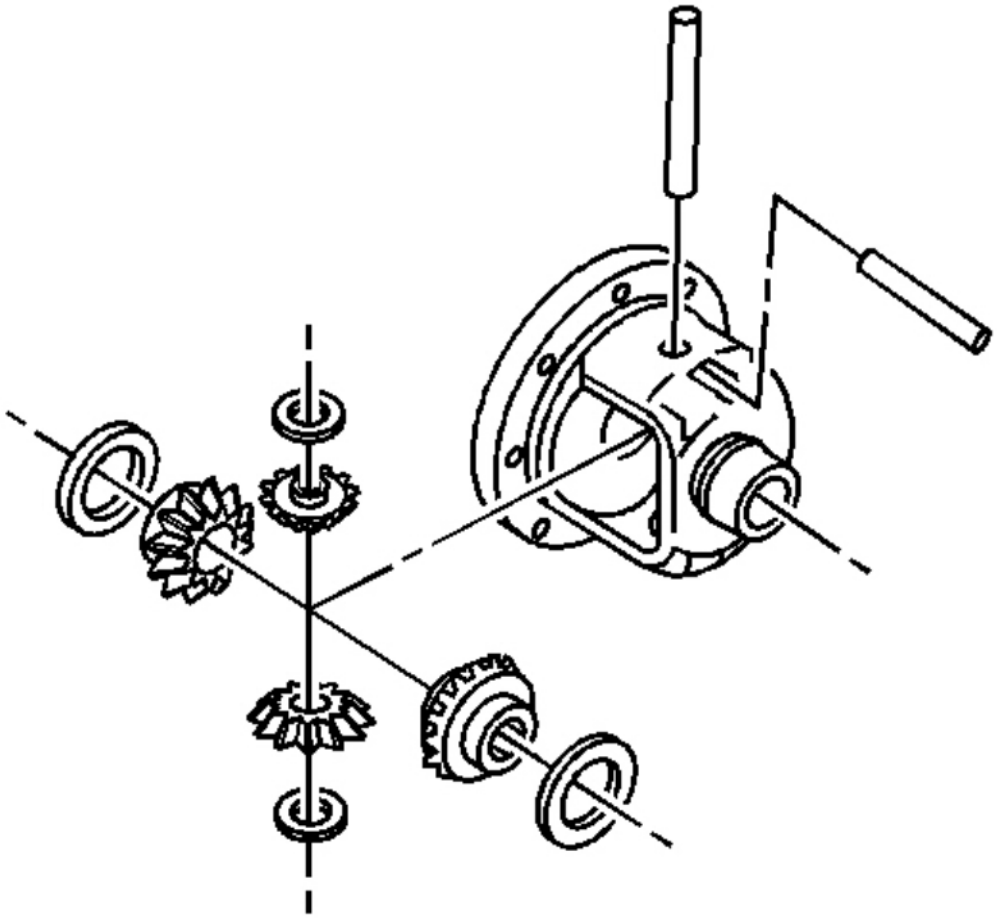


Fig. 218: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

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.

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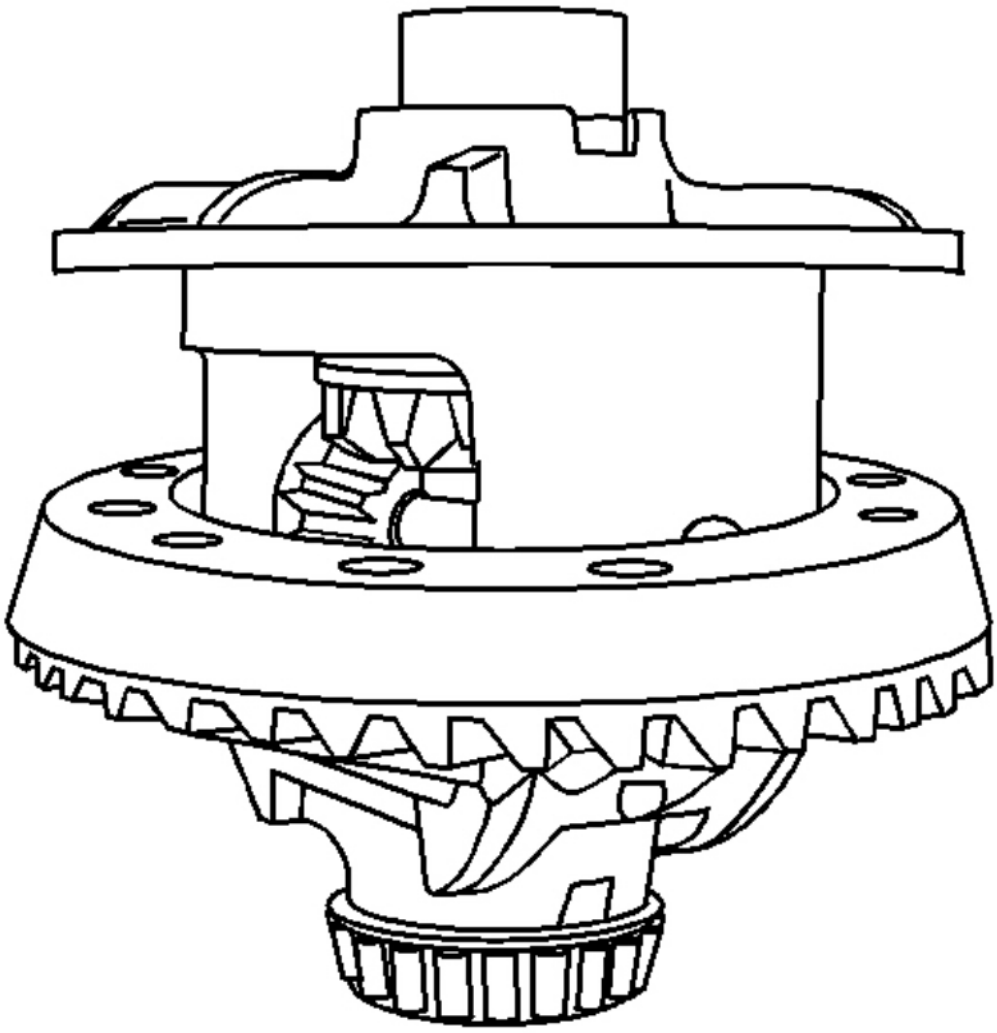


Fig. 219: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

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

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the differential case.

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

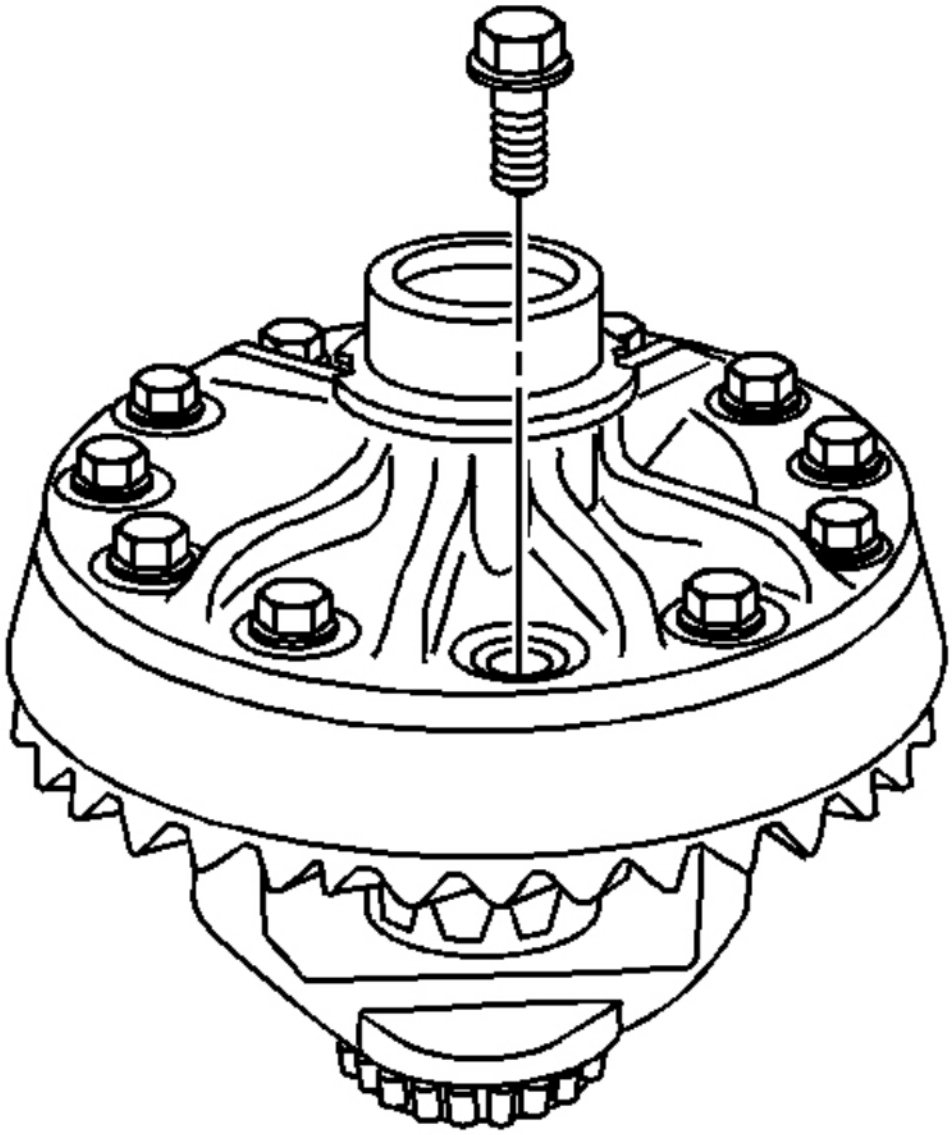
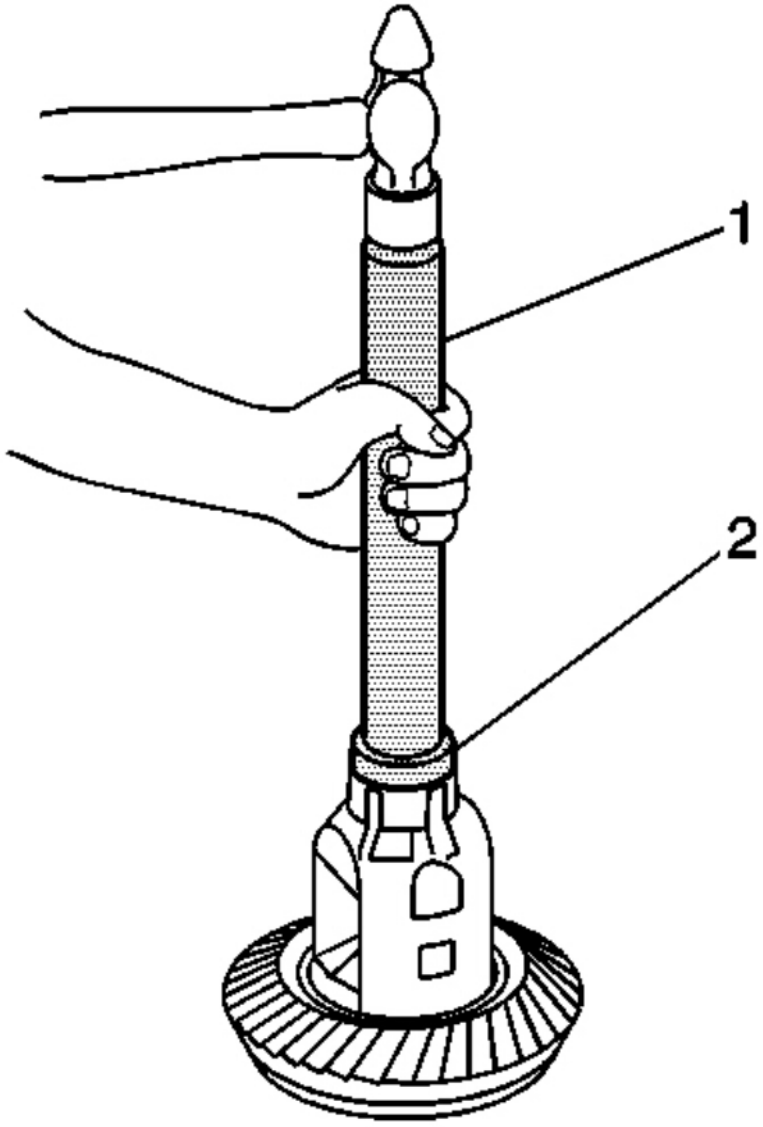


Fig. 220: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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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** .



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Fig. 221: Driving The Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS CORP.

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 (1) and the J 22888-20A (2) onto the differential side bearing.
    3. Remove the differential side bearings using the J 22888-20A .

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

2. Remove the ring gear bolts.

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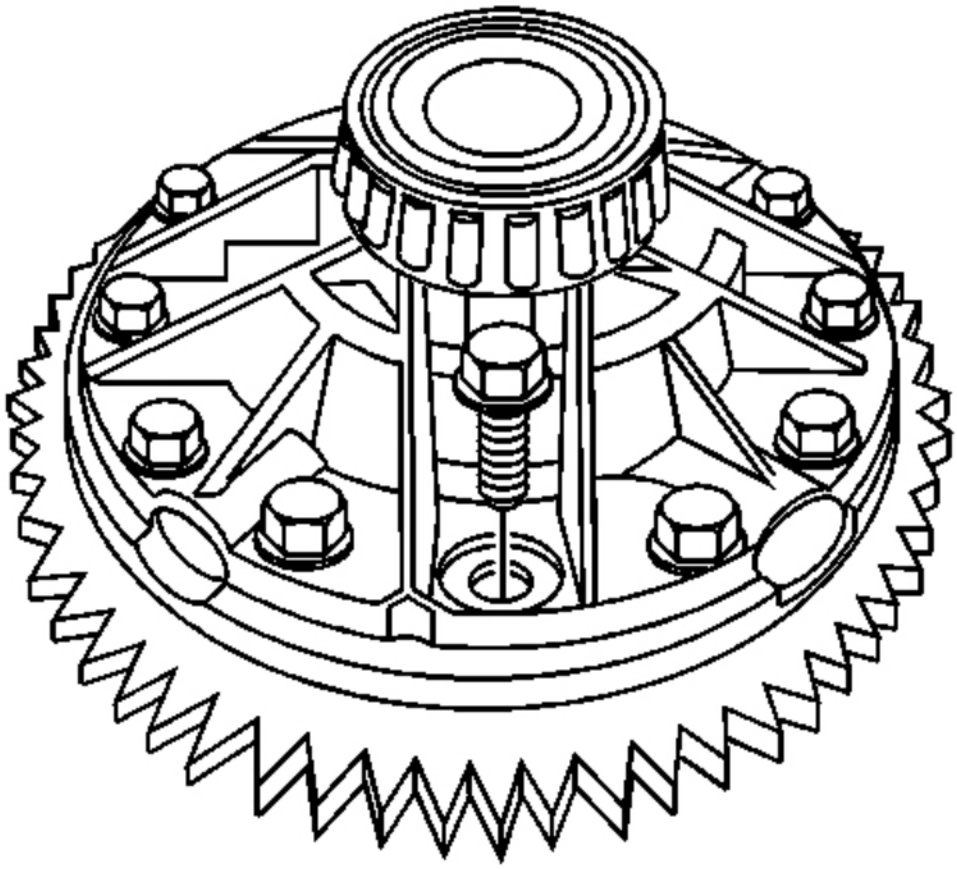


Fig. 222: View Of Ring Gear Bolts (10.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Ring Gear Removal Notice in Cautions and Notices.

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.

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.

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5. Remove the following from the differential case:
    - The thrust washers
    - The differential pinion gears
    - The differential pinion spider

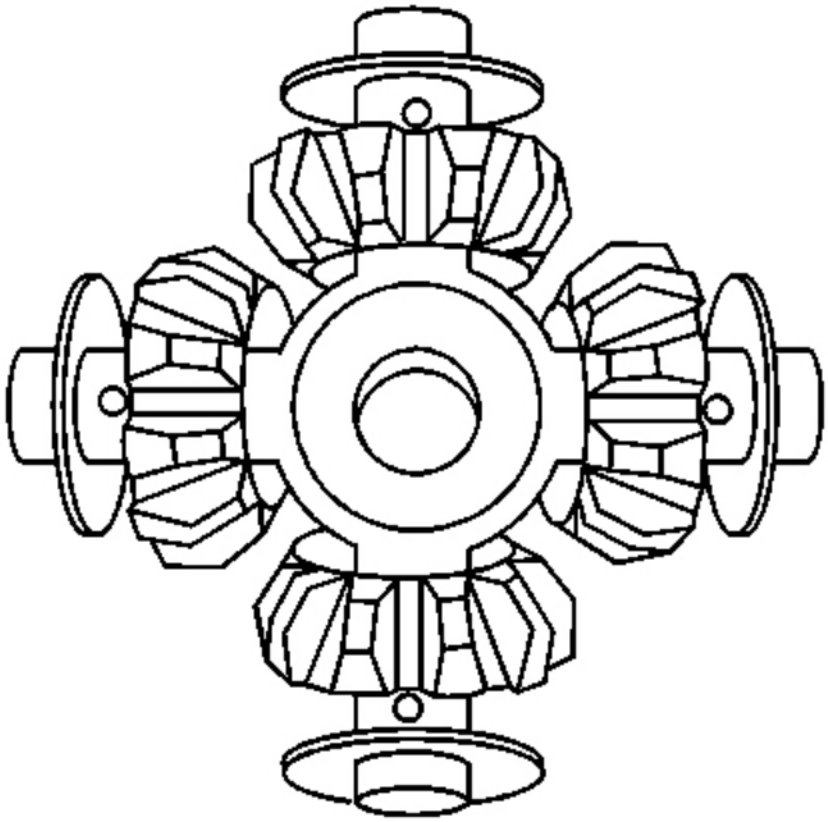


Fig. 223: View Of Differential Pinion Gears, Pinion Spider & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

6. Remove the differential side gears.

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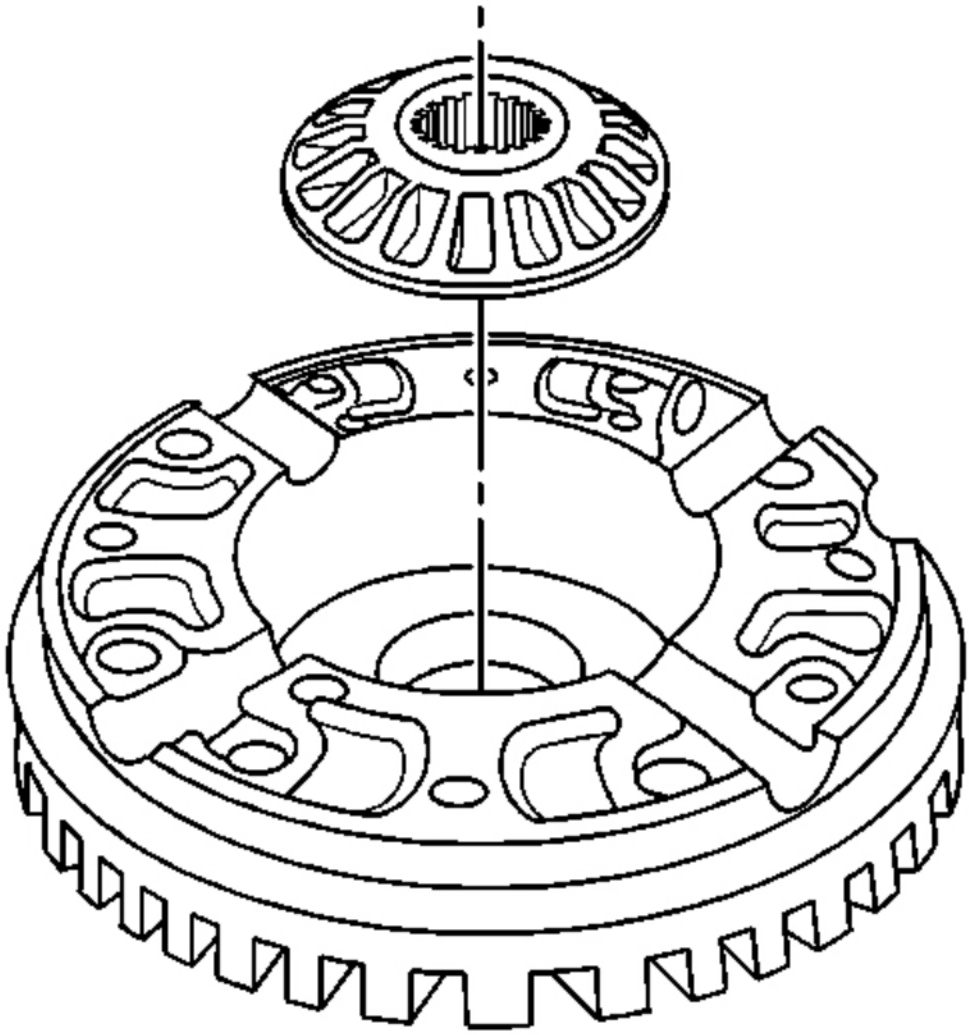


Fig. 224: View Of Differential Side Gears
Courtesy of GENERAL MOTORS CORP.

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** in Maintenance and Lubrication.
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.

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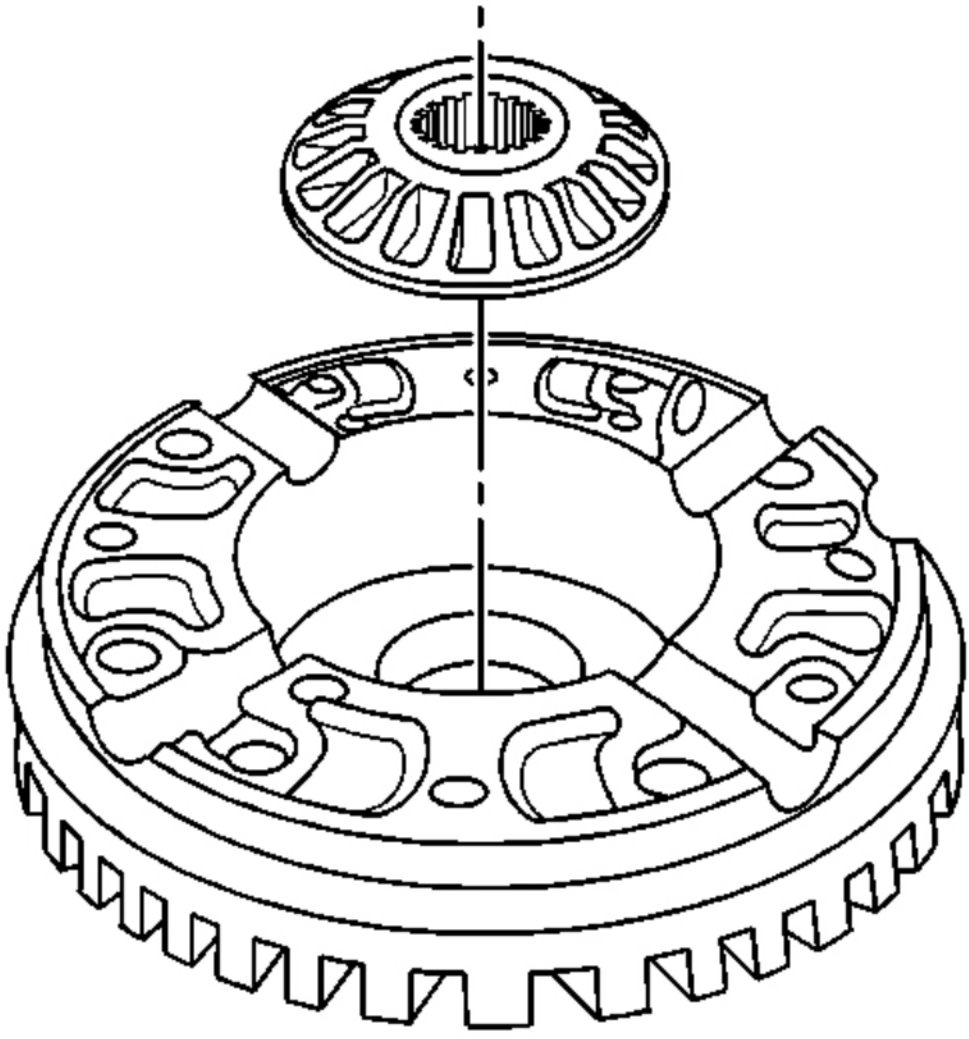


Fig. 225: View Of Differential Side Gears
Courtesy of GENERAL MOTORS CORP.

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.

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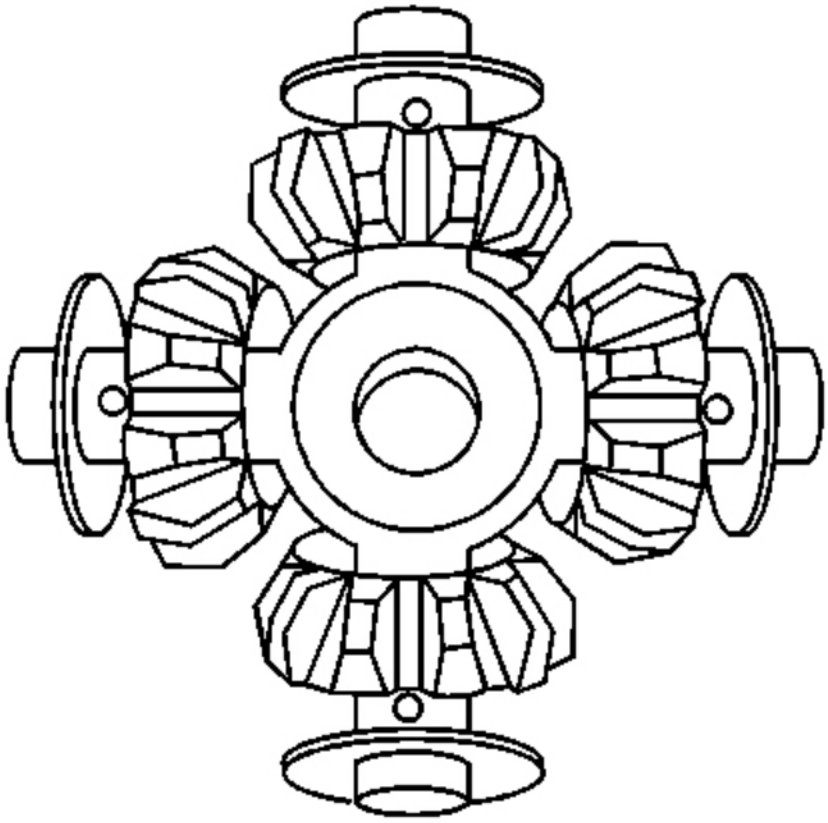


Fig. 226: View Of Differential Pinion Gears, Pinion Spider & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

4. Assemble the differential case halves.

   Align the arrow in the differential case as shown.

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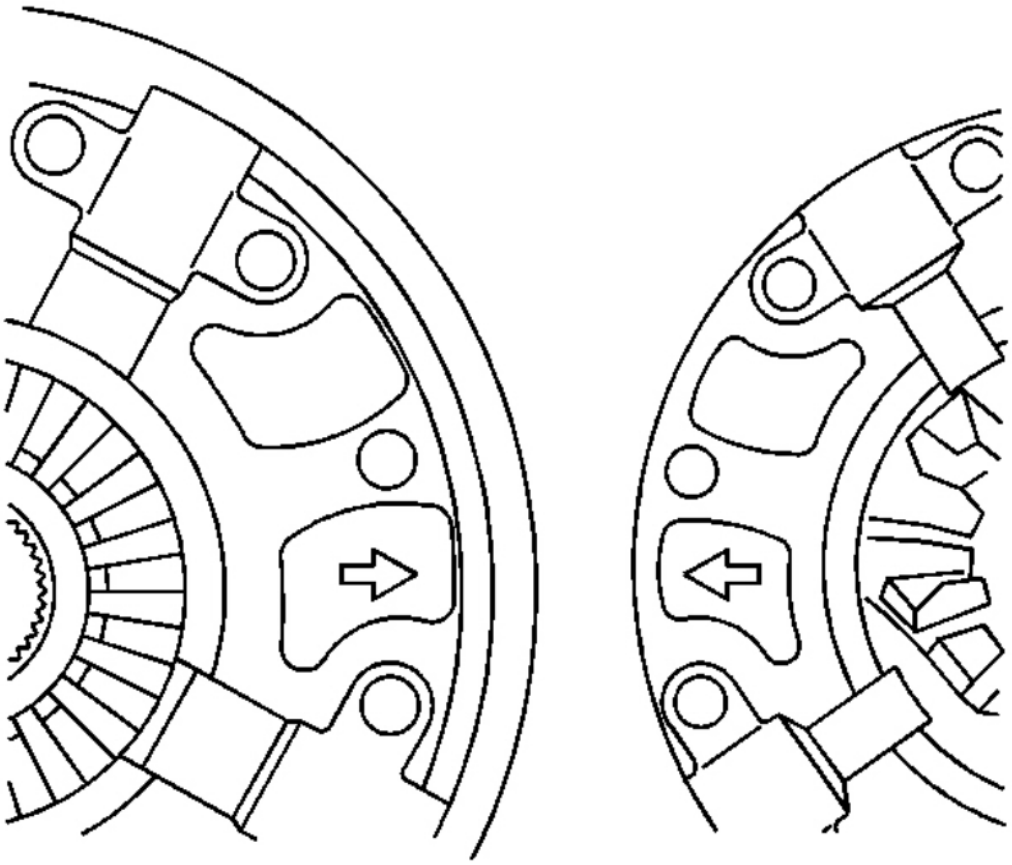


Fig. 227: Aligning Arrows On Differential Case
Courtesy of GENERAL MOTORS CORP.

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

5. Install the ring gear to the differential case.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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

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the differential case.

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

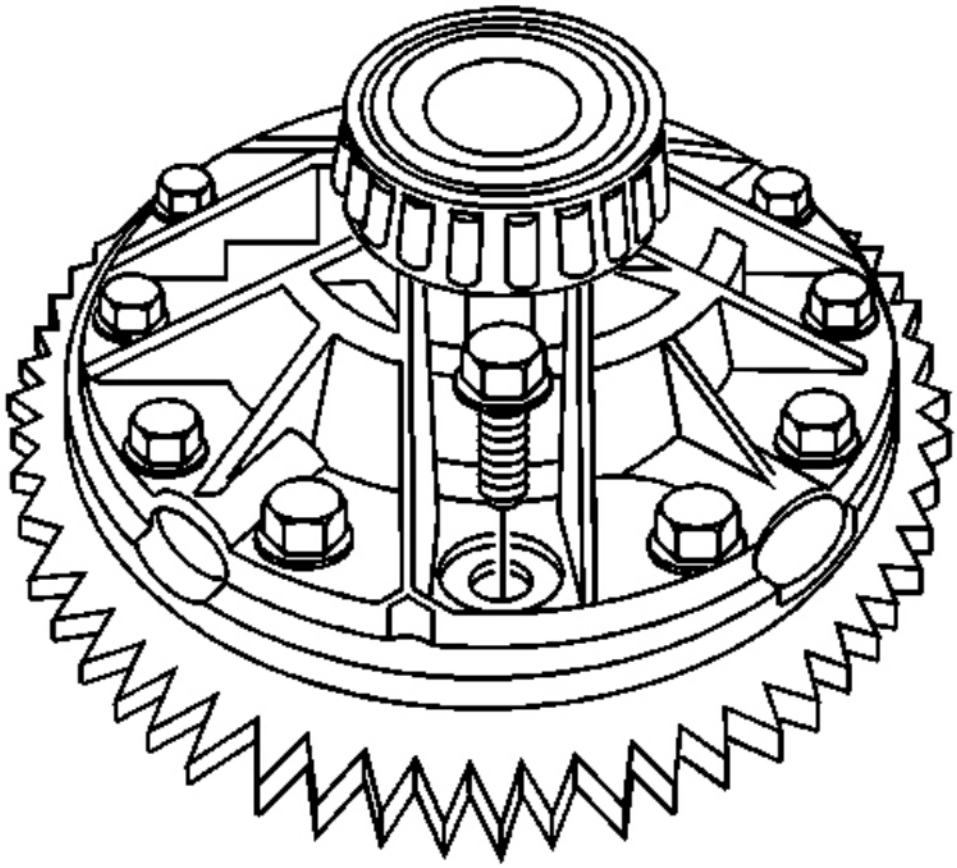


Fig. 228: View Of Ring Gear Bolts (10.5 Inch Axle)
Courtesy of GENERAL MOTORS CORP.

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.
    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** .

DIFFERENTIAL OVERHAUL (8.6 INCH AXLE)

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Disassembly Procedure

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

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

2. Remove the gear bolts. Discard the bolts.

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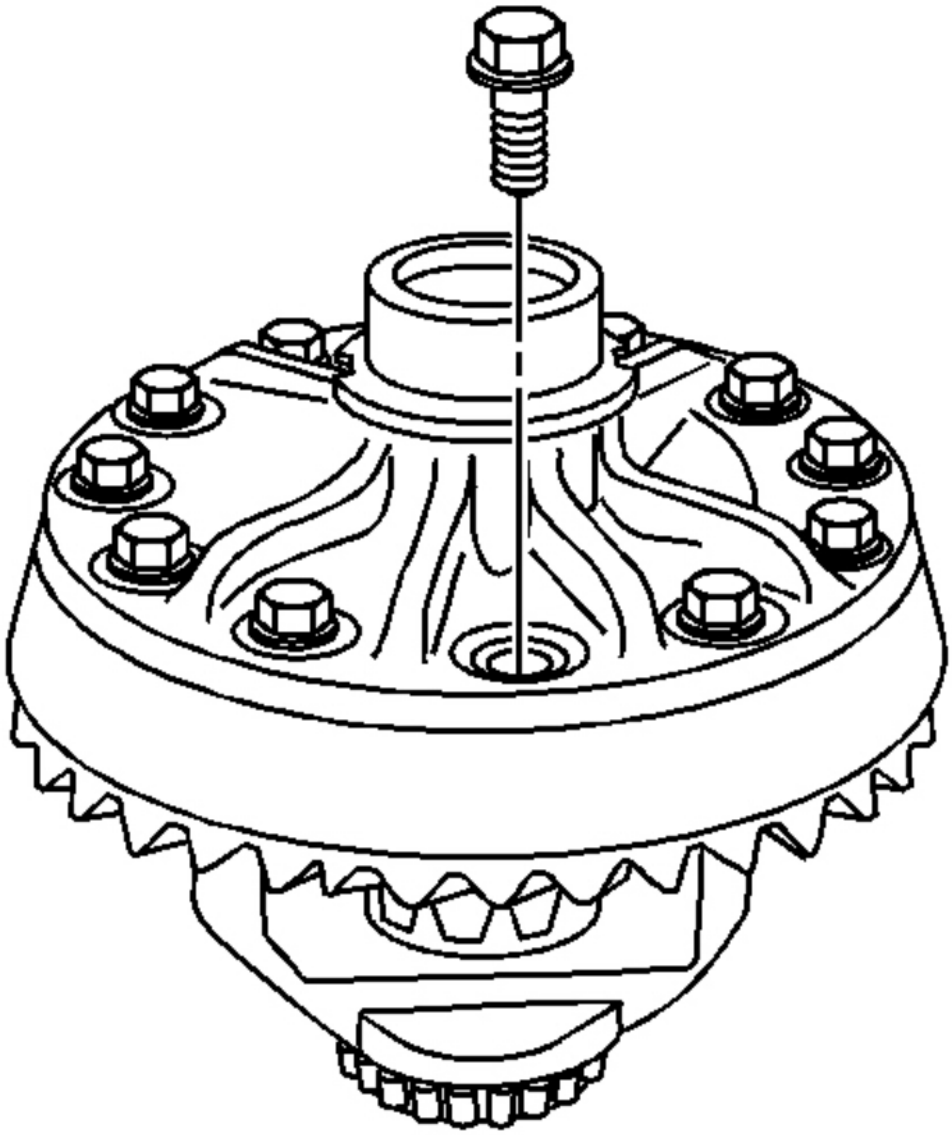


Fig. 229: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Ring Gear Removal Notice in Cautions and Notices.

3. Remove the ring gear from the differential case.

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

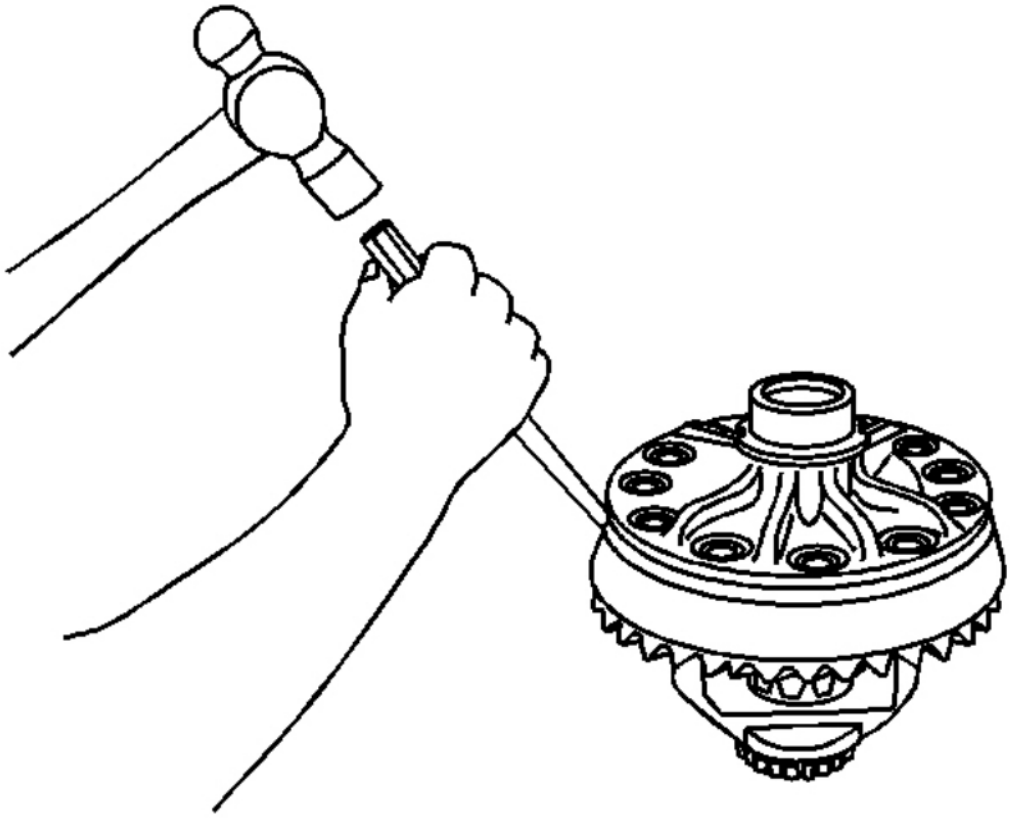


Fig. 230: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS CORP.

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.

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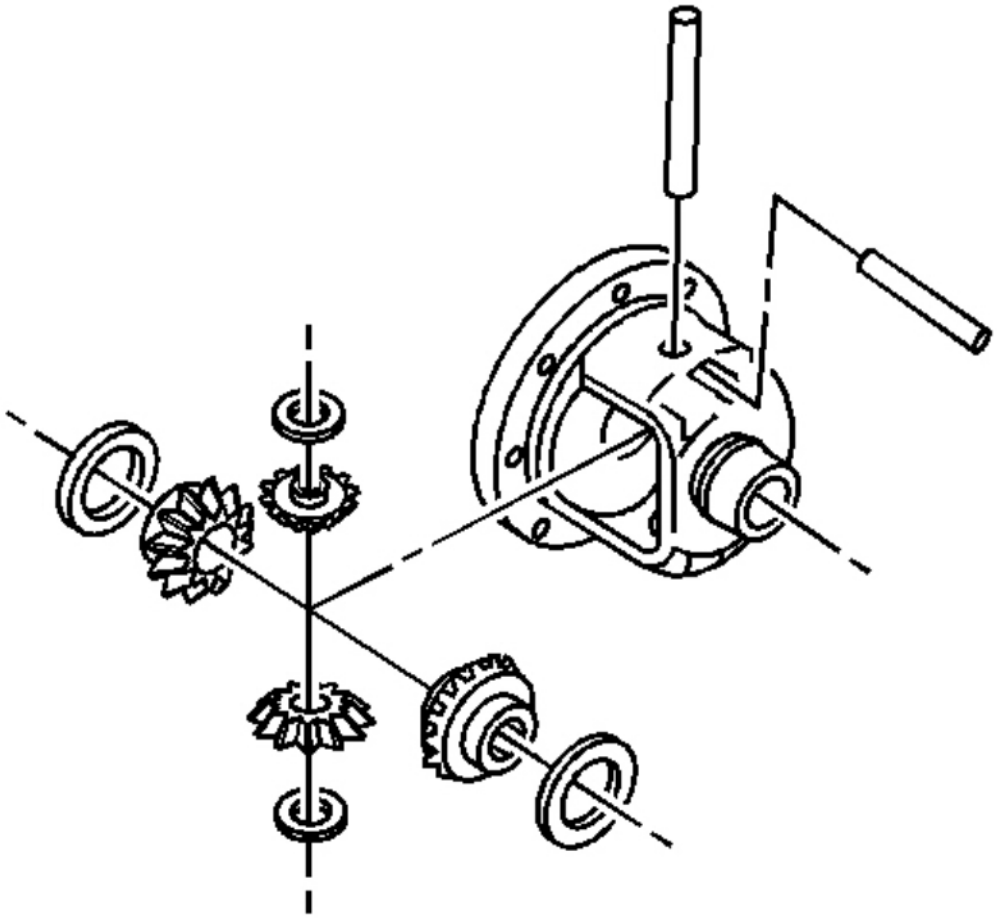


Fig. 231: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

Assembly Procedure

1. Lubricate the pinion and side gears using axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
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.

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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 in Cautions and Notices.

6. Install a new pinion shaft lock bolt.

   Tighten: Tighten the new pinion shaft lock bolt to 36 N.m (27 lb ft).

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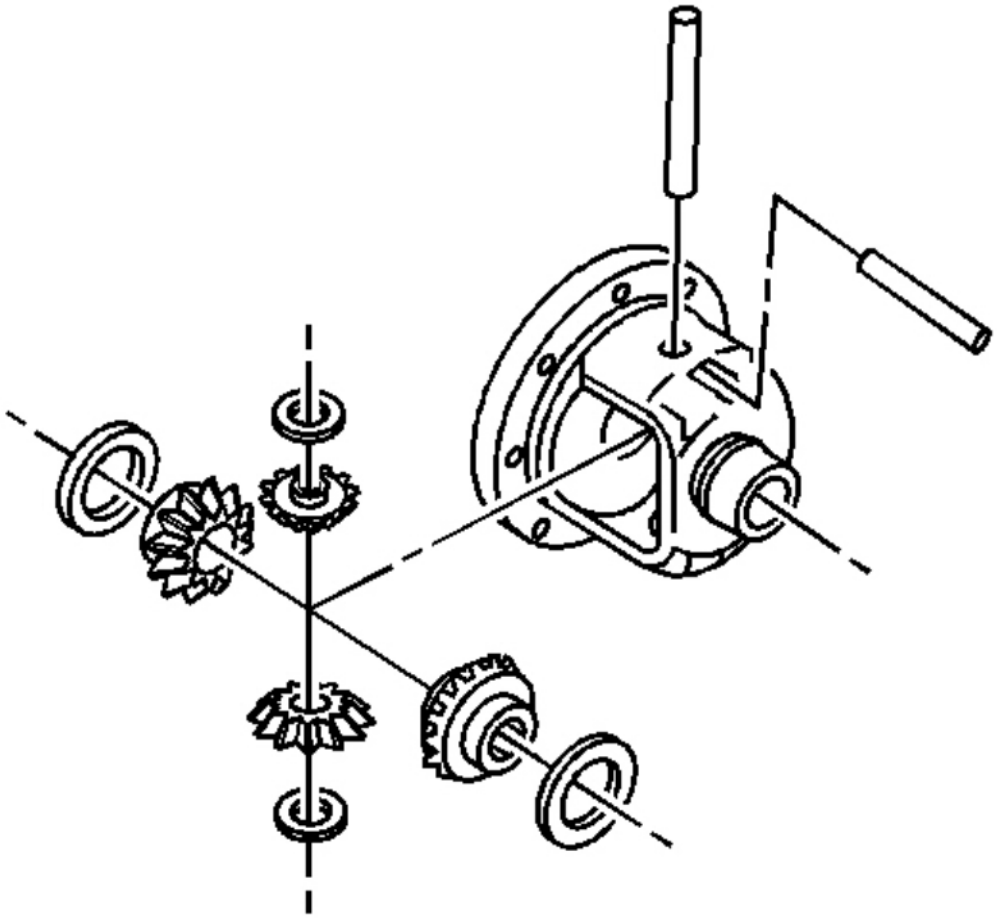


Fig. 232: Exploded View Of Differential Case
Courtesy of GENERAL MOTORS CORP.

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.

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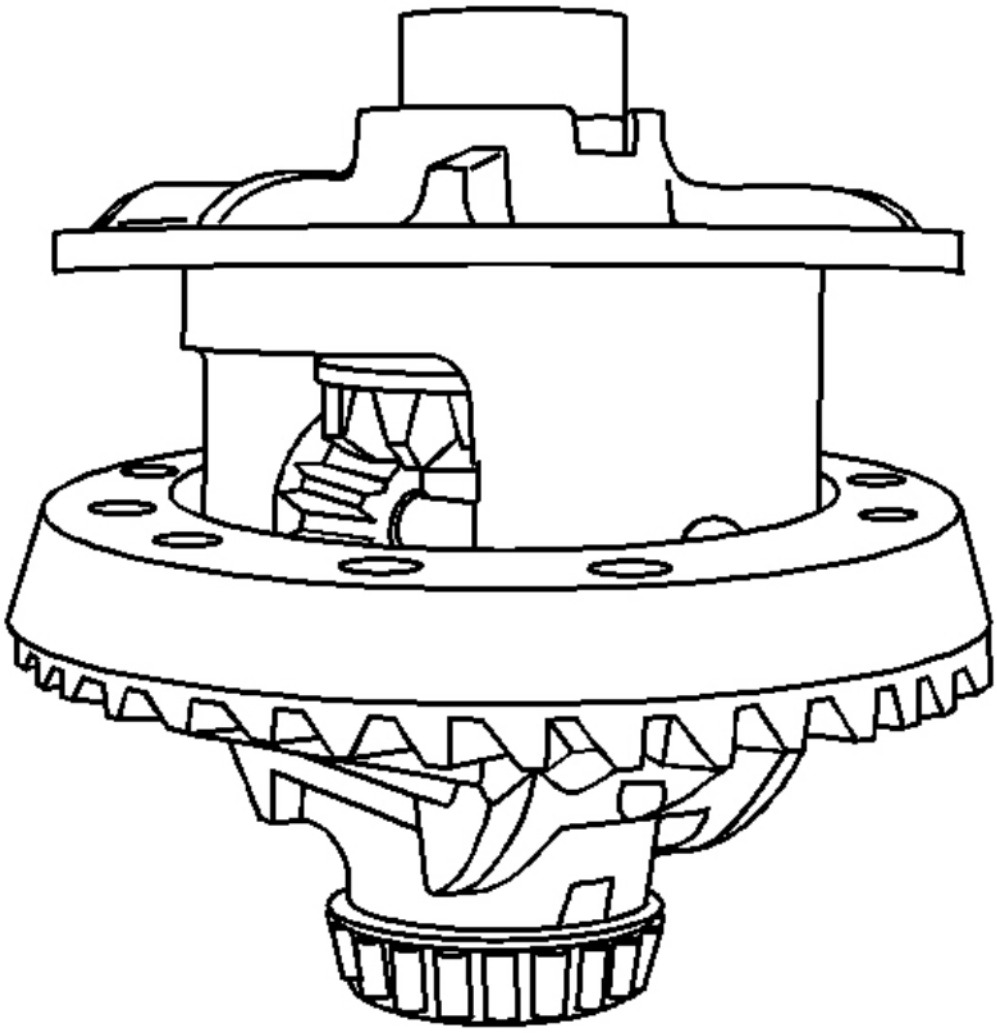


Fig. 233: Ring Gear & Differential Case
Courtesy of GENERAL MOTORS CORP.

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

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the differential case.

Tighten: Tighten the ring gear bolts in sequence to 120 N.m (89 lb ft).

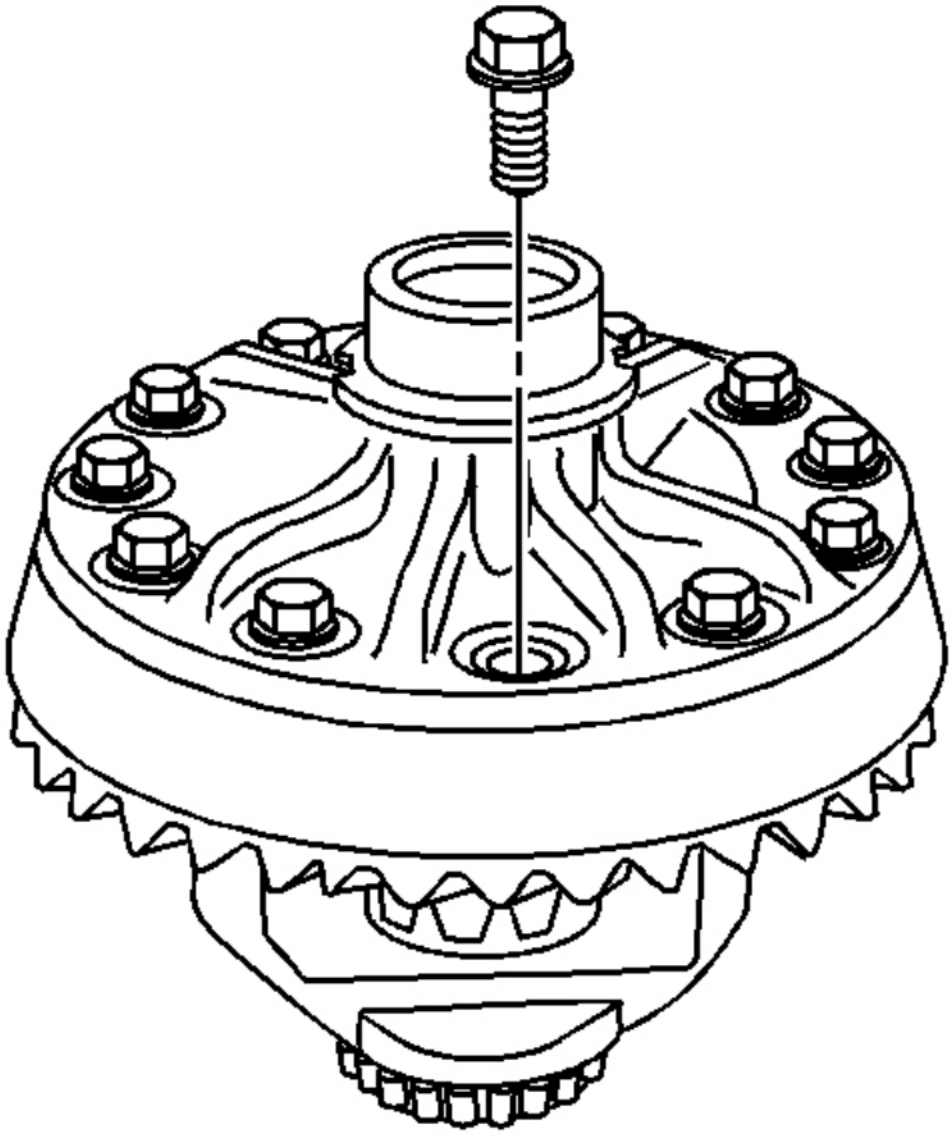


Fig. 234: Identifying Ring Gear Bolts
Courtesy of GENERAL MOTORS CORP.

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10. Install the differential side bearings. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.

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.

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- 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 (8.6 INCH, 9.5 INCH AXLES)

Tools Required

- **J 21777-85** Gage and Plate, 9.5 inch axle. See **Special Tools and Equipment**.
- **J 21777-86** Side Bearing Disc, 9.5 inch axle, 2 Required
- J 34925 Pinion Setting Gage and Components
- **J 8001** Dial Indicator Set

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** in Maintenance and Lubrication.
2. Install the pinion bearings into the axle housing.
3. Assemble the following components into the axle housing:
   - For the 8.6 in 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 in axle, assemble the J 21777-8 (1), the J 21777-43 (2), the J 21777-42 (3), and the J 21777-85 (4) as shown.

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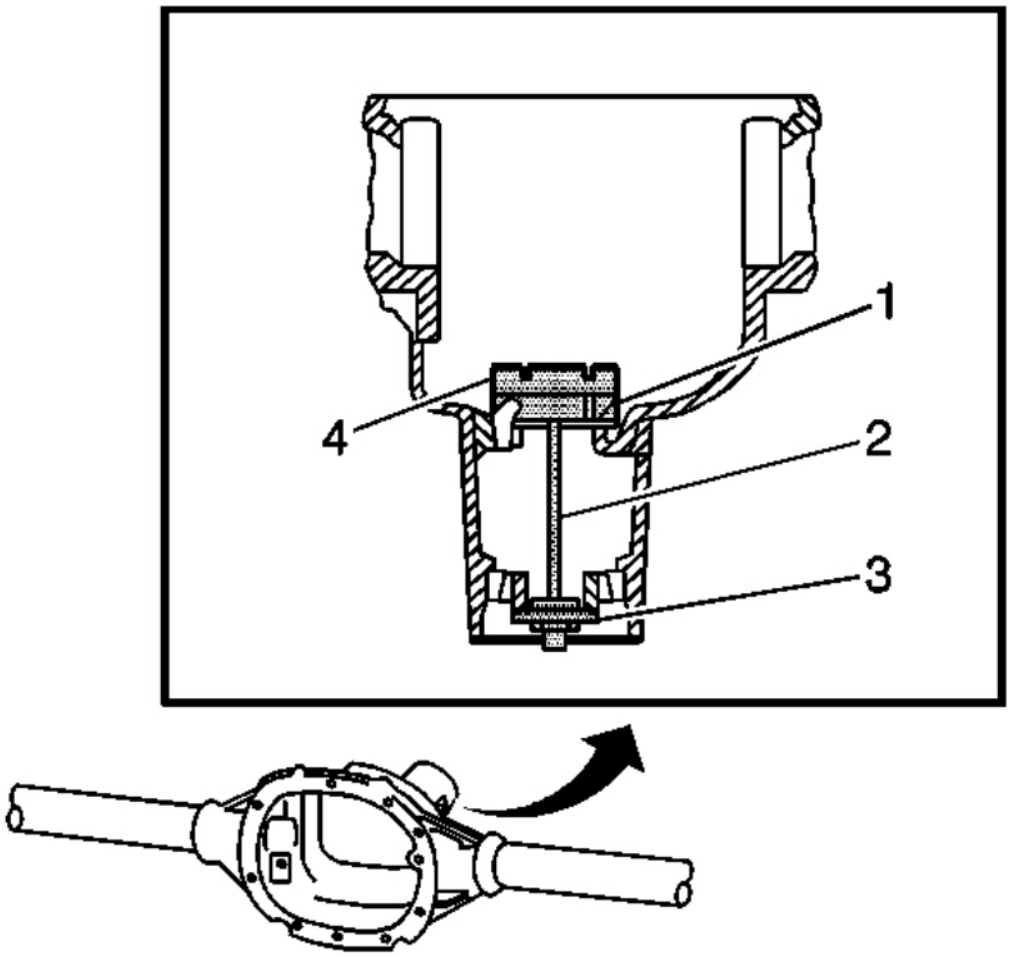


Fig. 235: Installed View Of J 21777-35, J 21777-43, J 21777-42, & J 45230
Courtesy of GENERAL MOTORS CORP.

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.
6. Assemble the following components into the differential carrier bore of the axle housing:
   - For the 8.6 in axle, assemble the J 21777-45 (1, 2) to the J 21777-1 (3) as shown.
   - For the 9.5 in axle, assemble the J 21777-86 (1, 2) to the J 21777-1 (3) as shown.

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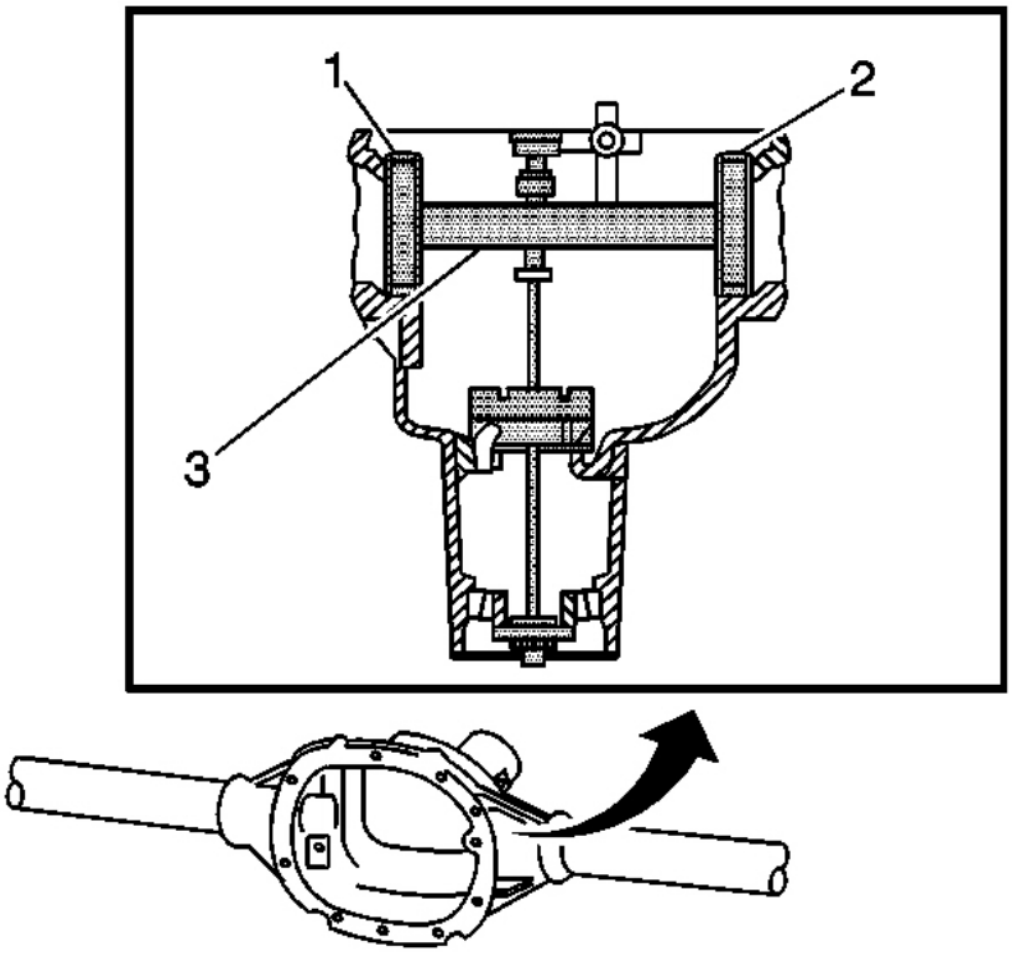


Fig. 236: Installed View Of J 21777-45 & J 21777-1
Courtesy of GENERAL MOTORS CORP.

7. Install the bearing caps.

NOTE: **Refer to Fastener Notice in Cautions and Notices.**

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 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

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the components, inspect for proper seating and/or mis-aligned components and re-assemble. See **Special Tools and Equipment**.

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 21777-85** , 9.5 inch axle (2). See **Special Tools and Equipment**.

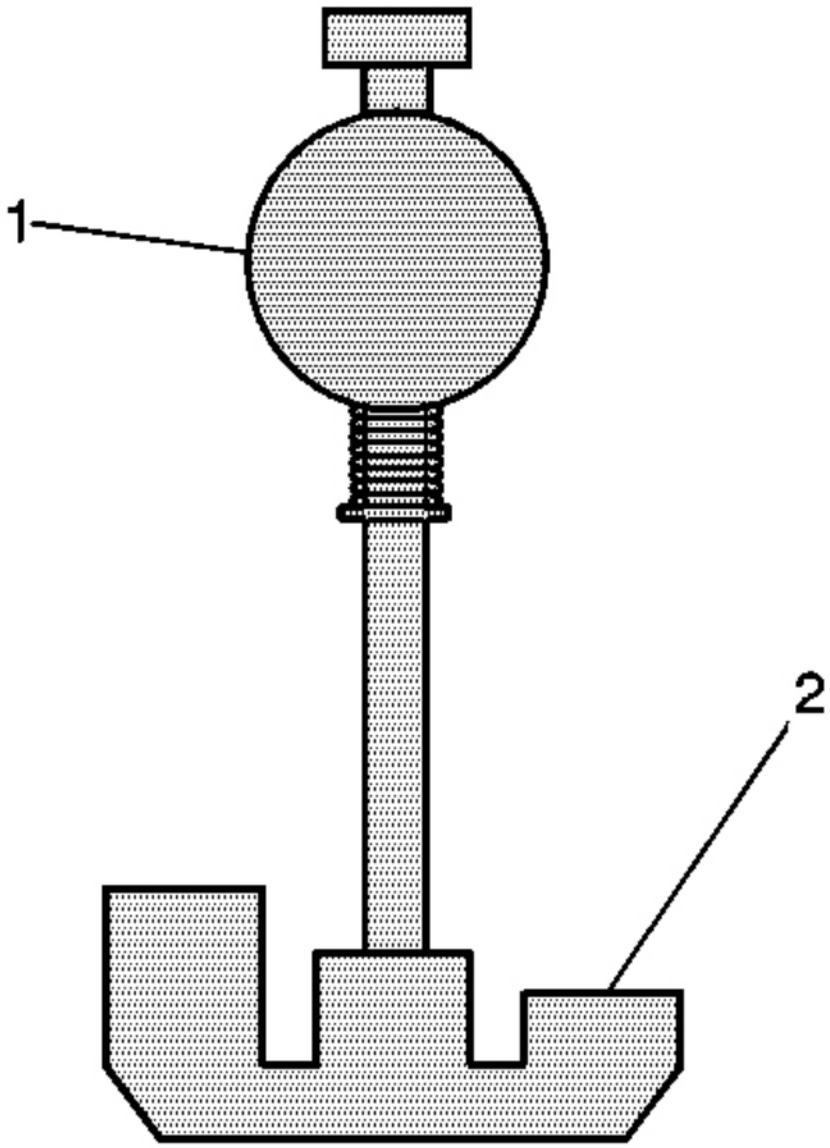


Fig. 237: J 21777-1 & J 44416-3
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11. Install the **J 8001** to the J 21777-1 as follows:
    1. Loosely clamp the **J 8001** onto the stem on the J 21777-1.
    2. Place the contact pad of the **J 8001** onto the mounting post of the J 21777-1.
    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.

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, or the **J 21777-85** , 9.5 inch axle, until it no longer touches the J 21777-29 or the **J 21777-85** . See **Special Tools and Equipment**.
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.

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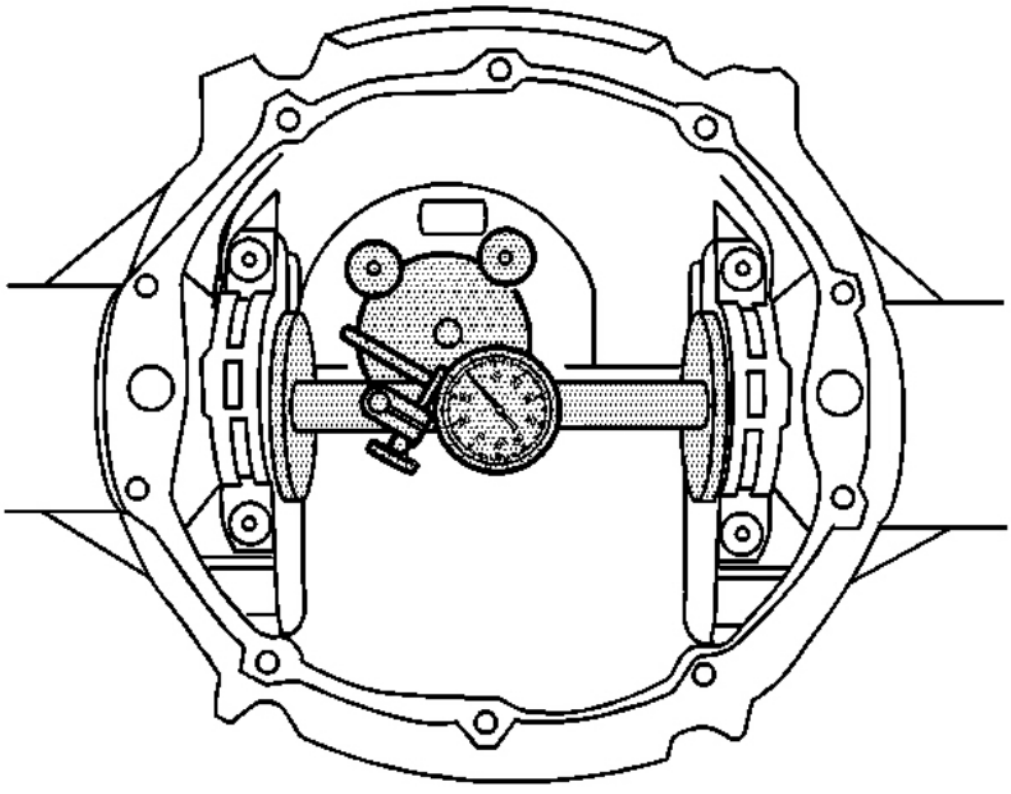


Fig. 238: Measuring Necessary Shim Thickness
Courtesy of GENERAL MOTORS CORP.

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 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.

PINION DEPTH ADJUSTMENT (9.75 INCH AXLE)

Tools Required

- **J 22536** Pinion Driver. See **Special Tools and Equipment**.
- **J 24433** Pinion Cone and Side Bearing Installer
- J 34925 Pinion Setting Gage and Components
- **J 45692** Pinion Shim Selector Kit - Dana Axles

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- **J 45710** Pinion Bearing Oil Seal Installer
- **J 8001** Dial Indicator Set
- **J 8614-01** Flange and Pulley Holding Tool

IMPORTANT:

- **Make sure all of the tools, the differential side bearing bores, and the pinion bearing cups are clean before proceeding.**
- **The pinion position shim may be located between the oil deflector and the axle housing. If the pinion position shim is located between the oil baffle and the axle housing, the shim must be removed before the pinion depth measuring procedure can be performed.**

1. Remove the drive pinion, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
2. Remove the inner pinion bearing, if necessary. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
3. Inspect the axle housing for a pinion position shim between the inner pinion bearing cup or the oil baffle and the axle housing.
4. If a shim is present, remove the oil baffle, the pinion position shim, and the inner pinion bearing cup. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
5. Install the inner pinion bearing cup, if removed. Do not install the oil baffle or the pinion position shim at this time. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
6. Lubricate the pinion bearings with axle lubricant. Refer to **Fluid and Lubricant Recommendations** in Maintenance and Lubrication.
7. Assemble the J 45692-5 (2) and the outer pinion bearing onto the J 21777-43 (1) as shown.

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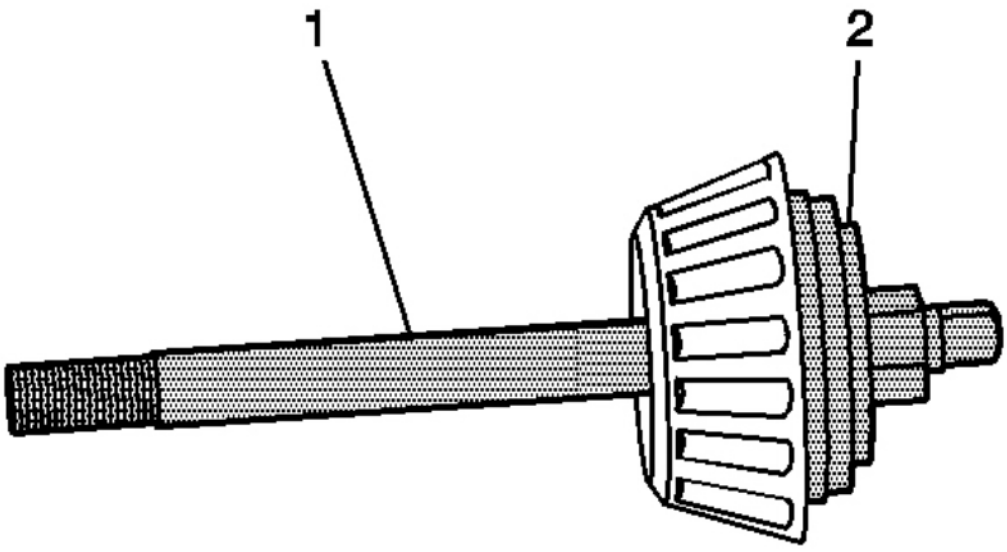


Fig. 239: Assembling J 45692-5 & Outer Pinion Bearing Onto J 21777-43
Courtesy of GENERAL MOTORS CORP.

8. Install the J 45692-5, the outer pinion bearing, and the J 21777-43 into the axle housing.

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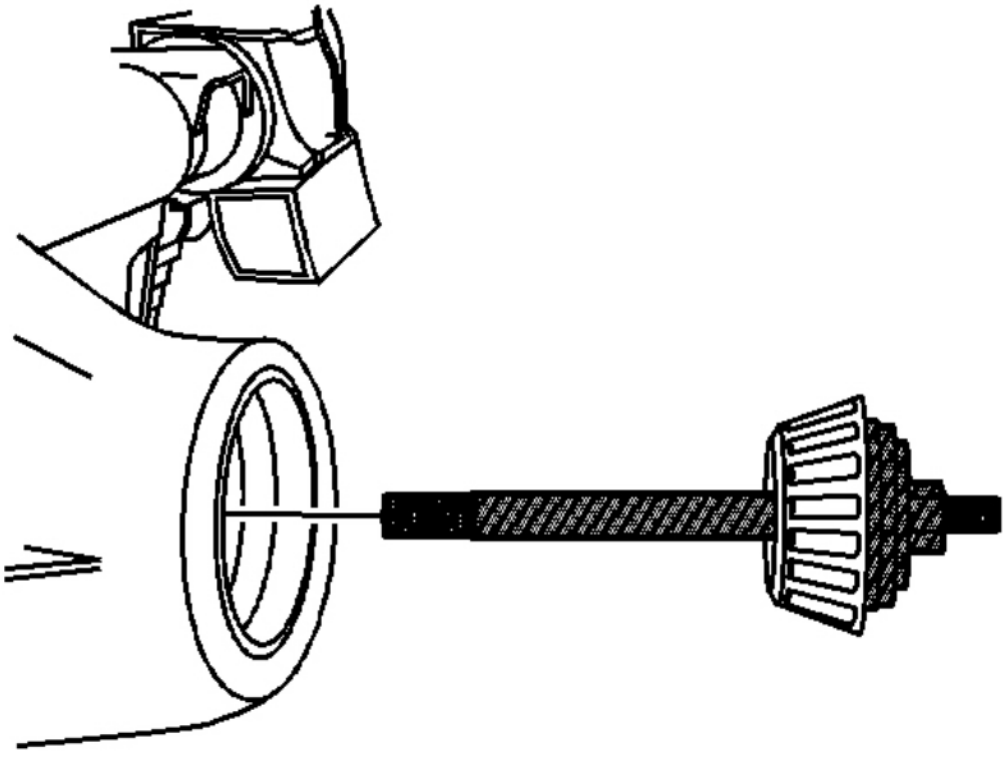


Fig. 240: Installing J 45692-5, Outer Pinion Bearing & J 21777-43 Into Axle Housing
Courtesy of GENERAL MOTORS CORP.

9. Install the inner pinion bearing into the axle housing.
10. Install the J 21777-35 into the inner pinion bearing as shown.

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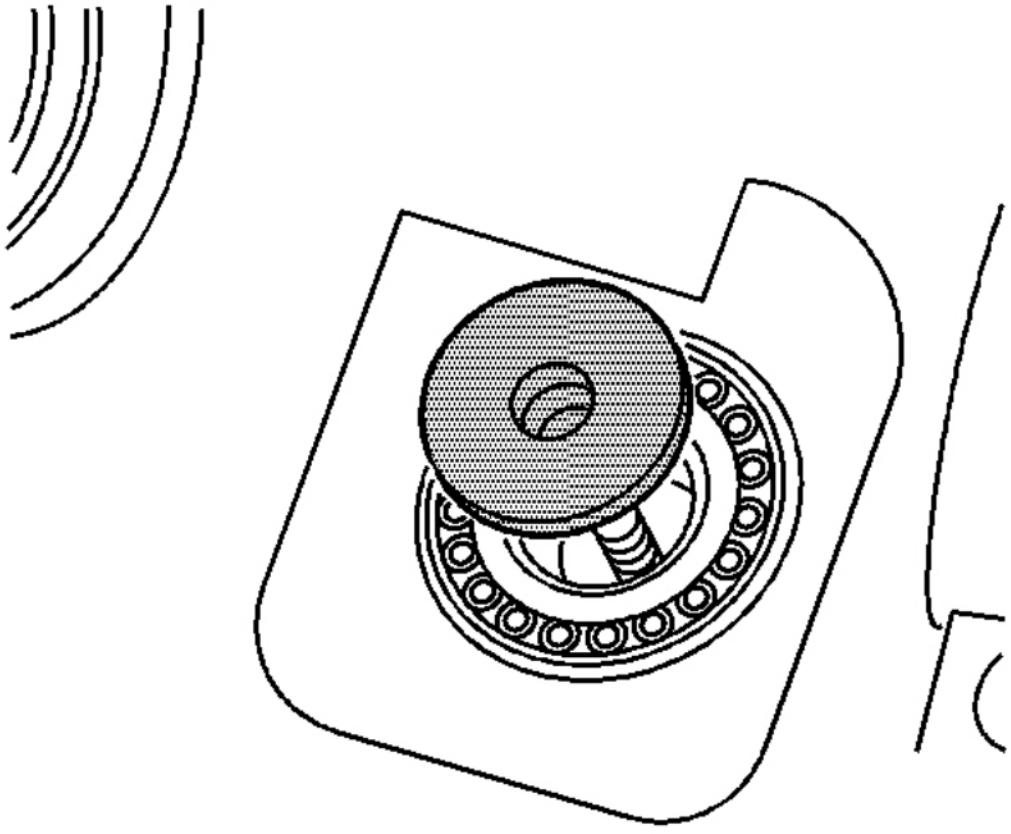


Fig. 241: Installing J 21777-35 Into Inner Pinion Bearing
Courtesy of GENERAL MOTORS CORP.

11. Install the J 45692-1 into the axle housing as shown.

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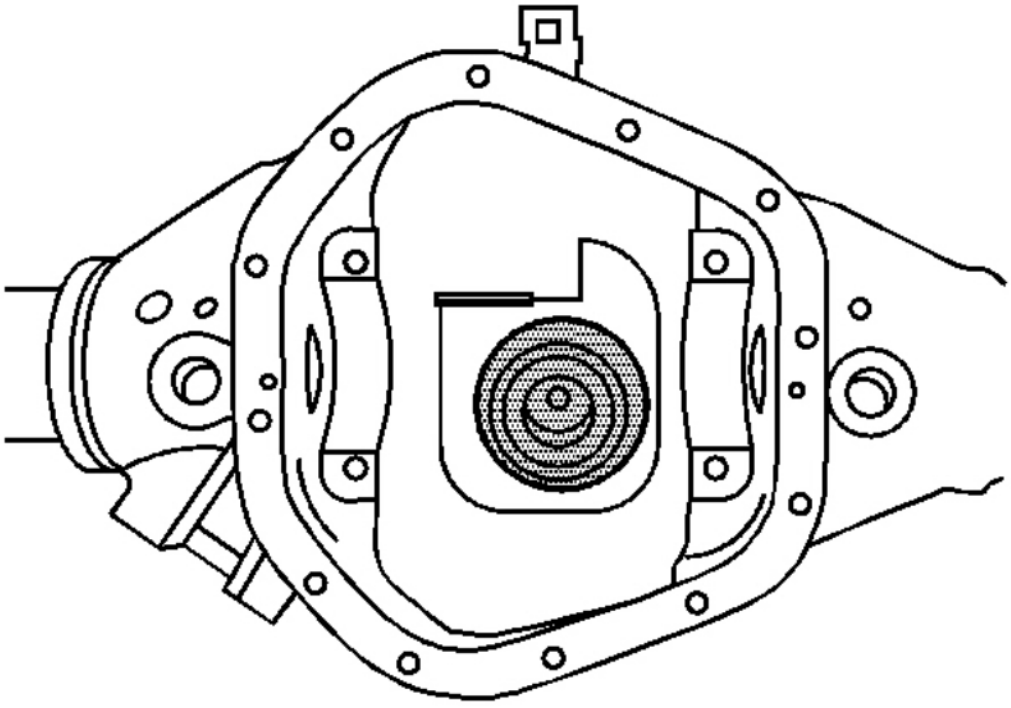


Fig. 242: Installing J 45692-1 Into Axle Housing
Courtesy of GENERAL MOTORS CORP.

12. While holding the J 21777-43 stationary, tighten the nut on the J 21777-43 just until the end play between the pinion bearings is removed.
13. Rotate the assembly several times in both directions in order to seat the pinion bearings.
14. Measure the rotating torque of the assembly using an inch-pound torque wrench.

    Specification: The rotating torque of the assembly should be between 2.3-5.1 N.m (20-45 lb in).

15. If the rotating torque of the assembly is less than 2.3 N.m (20 lb in), continue to tighten the nut of the J 21777-43 until a rotating torque of 2.3-5.1 N.m (20-45 lb in) is obtained.
16. Assemble the J 45692-2 (1) and the J 21777-1 (2) as shown.

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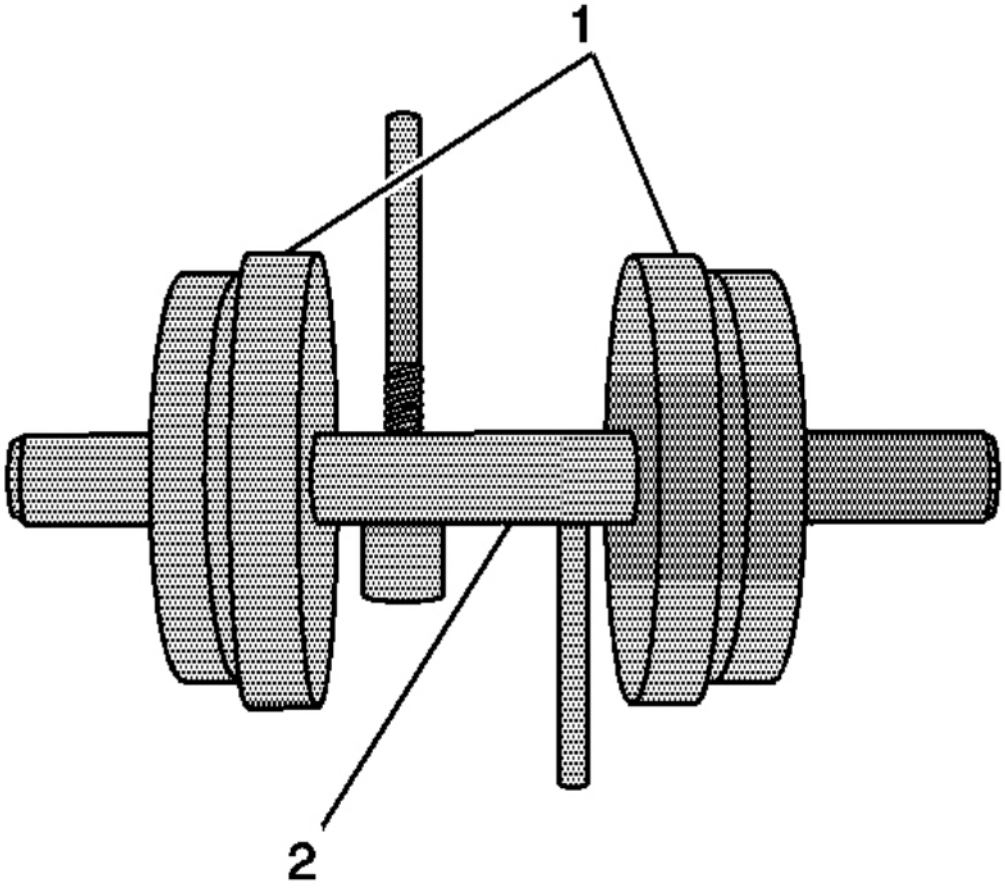


Fig. 243: Assembling J 45692-2 & J 21777-1
Courtesy of GENERAL MOTORS CORP.

17. Install the J 45692-2 (1) and the J 21777-1 (2) into the axle housing. Place the stem of the J 21777-1 onto the bottom step of the J 45692-1.

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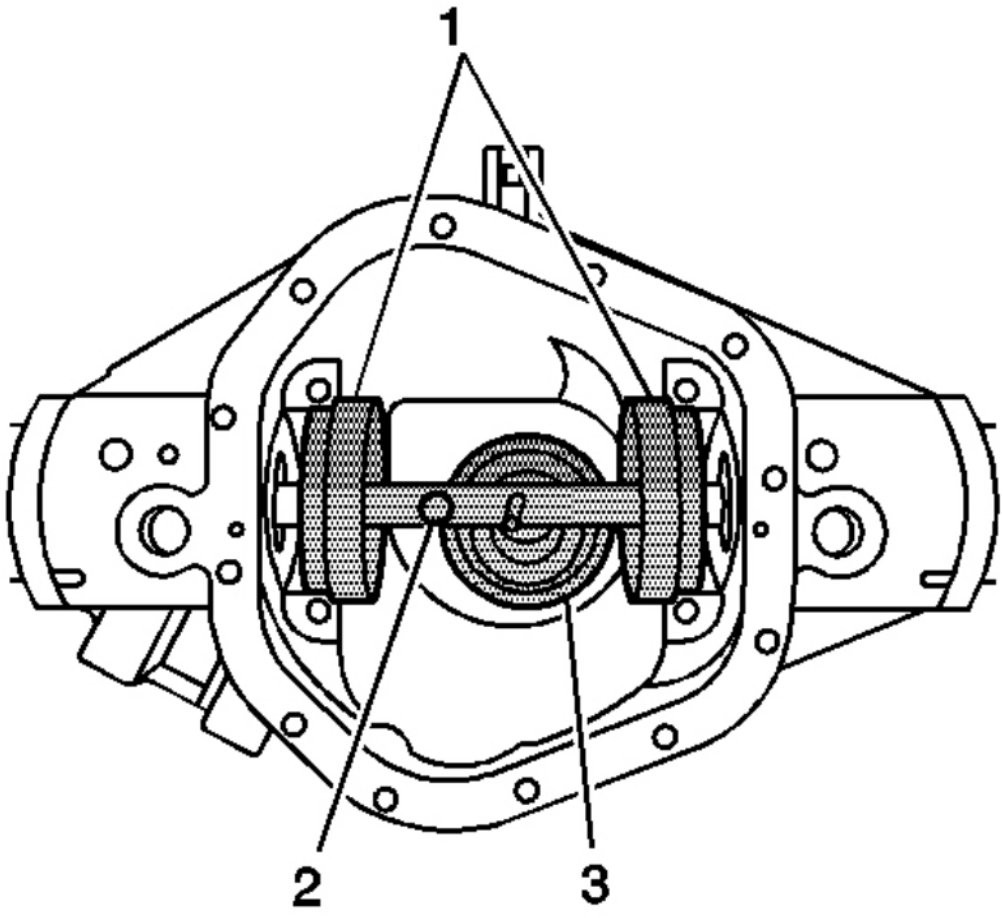


Fig. 244: Installing J 45692-2 & J 21777-1 Into Axle Housing
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: Corresponding letters are stamped on the bearing caps and axle housing. The bearing caps must be reassembled in the same position as removed.

18. Install the bearing caps and bearing cap bolts.

    Tighten: Tighten the bearing cap bolts to 75 N.m (55 lb ft).

19. Rotate the J 21777-1 within the J 45692-2. The J 21777-1 must rotate back and forth freely with the discs.

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If the J 21777-1 does not rotate freely, disassemble the components, inspect for proper seating and/or misaligned components and re-assemble.

20. 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.
21. Move the plunger of the J 21777-1 (1) back and forth on the bottom step of the J 45692-1 (2) until the needle of the **J 8001** indicates the greatest deflection.

    The deflection is the point where the needle changes direction.

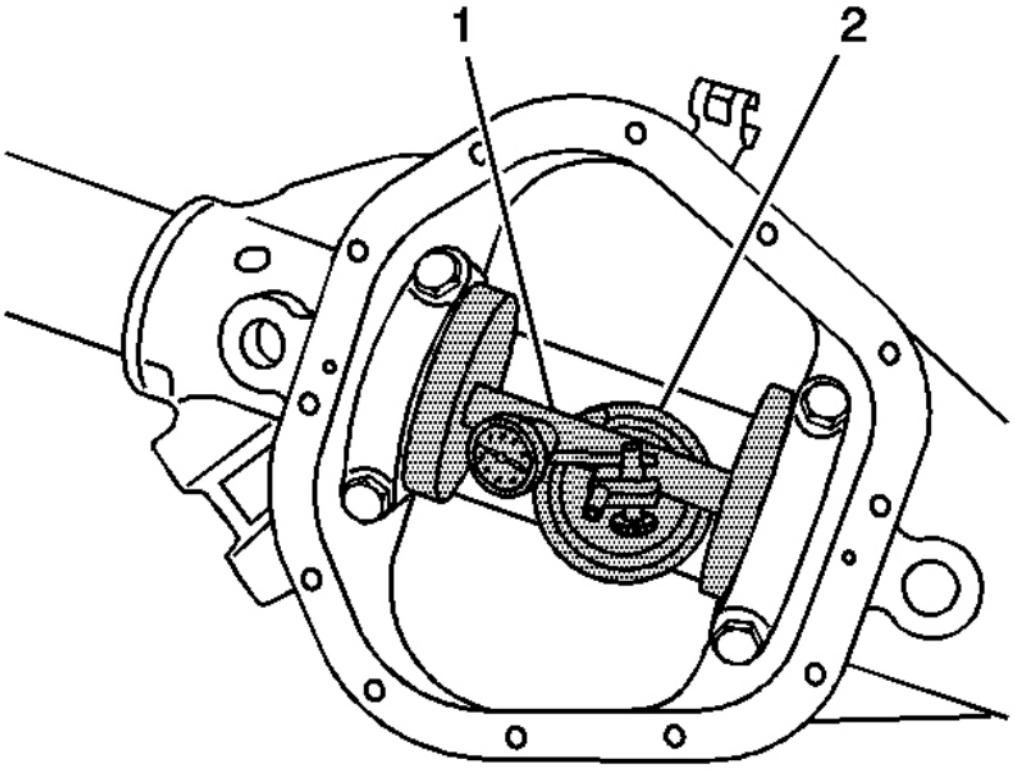


Fig. 245: Moving J 21777-1 Plunger On Bottom Step Of J 45692-1
Courtesy of GENERAL MOTORS CORP.

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22. At the greatest point of deflection, move the indicator housing of the **J 8001** until the needle indicates ZERO.
23. 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.
24. Rotate the plunger of the J 21777-1 (1) away from the J 45692-1 (2).

    The value indicated is the amount of pinion position shim thickness required for a nominal pinion setting.

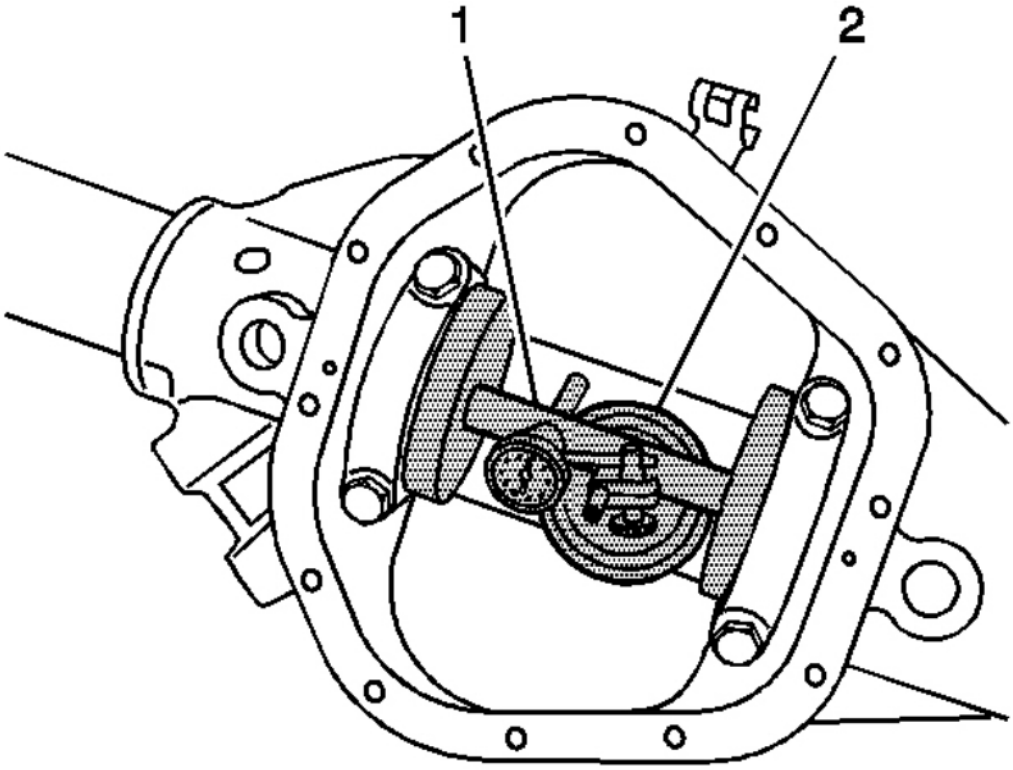


Fig. 246: Rotating J 21777-1 Plunger Away From J 45692-1
Courtesy of GENERAL MOTORS CORP.

25. If the oil baffle was removed, measure the thickness of the new oil baffle with a micrometer. Subtract this measurement from the thickness determined in step 23.
26. In order to adjust the thickness of the service pinion position shim for the drive pinion that is to be installed, do the following:
    1. Read the number on the button end of the pinion.

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If the number on the button end of the pinion is "0", no adjustment of the pinion preload shim pack is necessary.

2. If the number is not "0", the number will also have a corresponding "+" or "-" in front of it.

   The "+" or "-" indicates the amount of pinion position shim thickness that either needs to be added to or subtracted from the amount determined in step 24 in order to the drive pinion gear to be positioned properly within the axle housing.

   - For example, if the number on the button end of the pinion is a "+3", this indicates that 0.0762 mm (0.003 in) of shim thickness will need to be subtracted from the value determined in step 24 in order to place the teeth of the pinion in the best running position with the teeth of the ring gear. Refer to the table.
   - If the number on the button end of the pinion is a "-3", this indicates that 0.0762 mm (0.003 in) of shim thickness will need to be added to the value determined in step 24 in order to place the teeth of the pinion in the best running position with the teeth of the ring gear. Refer to the table.

27. Remove the pinion depth setting tools.
28. Remove the pinion bearings.
29. Select a service pinion position shim corresponding to the thickness determined in step 25.

    Measure the thickness of the shim with a micrometer in order to verify the thickness.

30. Remove the inner pinion bearing cup. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
31. Install the service pinion position shim, the new oil baffle, and the inner pinion bearing cup into the axle housing. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
32. Install the inner pinion bearing onto the drive pinion using the **J 24433** . See **Special Tools and Equipment**.

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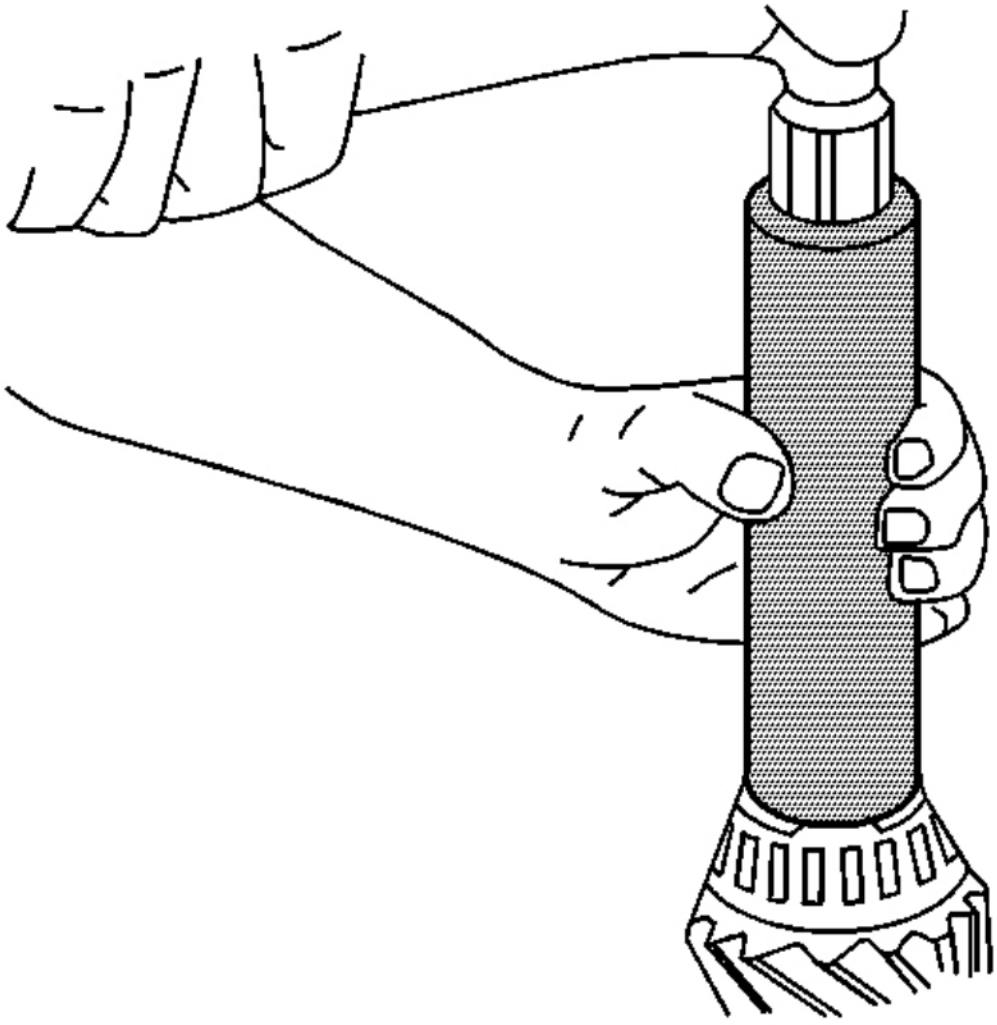


Fig. 247: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS CORP.

33. Install the original pinion preload shims onto the drive pinion. If the original shims are not available, assemble 1.52 mm (0.060 in) of pinion preload shims to install.

    Measure each shim separately with a micrometer and add the thickness together to determine the total shim pack size.

34. Install the drive pinion with the inner pinion bearing and the pinion preload shims into the axle housing.

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35. Install the outer pinion bearing.
36. Install the thrust washer.
37. 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.
38. Install the pinion yoke nut washer.
39. Install the pinion yoke nut.

    Tighten: Tighten the pinion yoke nut to 252 N.m (186 lb ft).

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

    Specification: The rotating torque of the drive pinion should be between 2.3-5.1 N.m (20-45 lb in).

41. If the rotating torque of the drive pinion is not within specifications, adjust the pinion preload shim thickness by doing the following:
    1. Install the **J 8614-01** to the pinion yoke.
    2. Remove the pinion nut while holding the **J 8614-01** .
    3. Remove the washer.
    4. Install the J 8614-2 (2) and the J 8614-3 (3) into the **J 8614-01** (1) as shown.
    5. Remove the pinion yoke by turning the J 8614-3 (3) clockwise while holding the **J 8614-01** (1).

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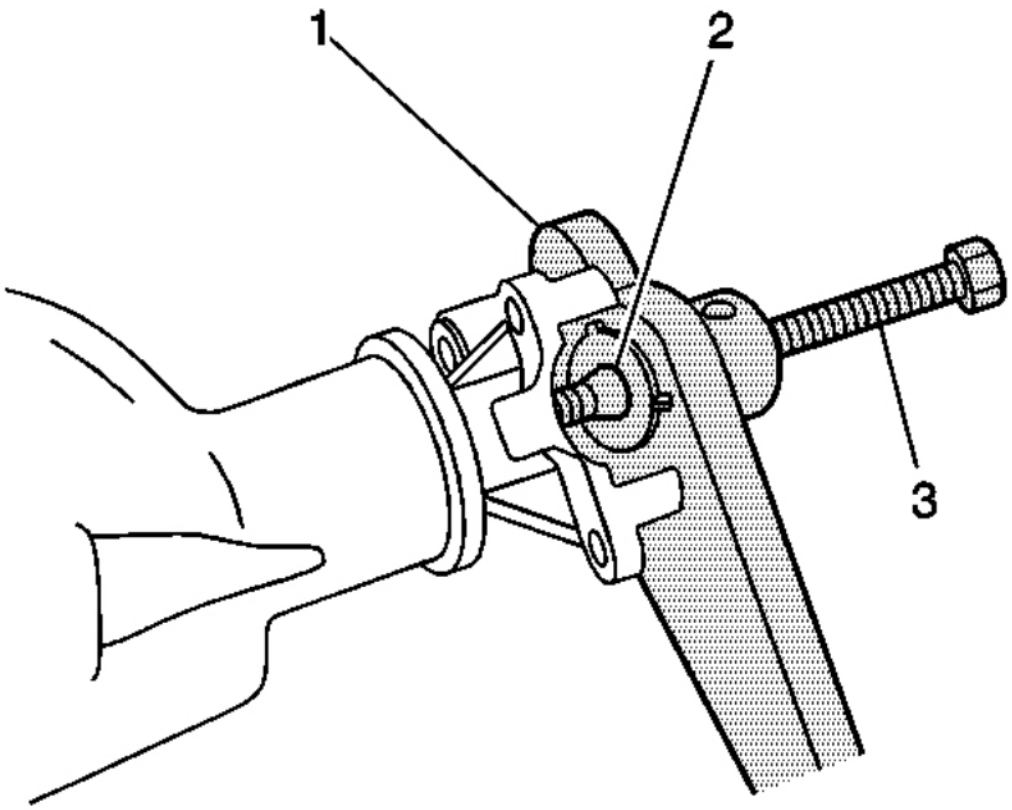


Fig. 248: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

6. Remove the thrust washer.
7. Install the **J 22536** .

   Ensure that the **J 22536** is firmly seated on the drive pinion. See **Special Tools and Equipment**.

8. Drive the pinion out using the **J 22536** and a hammer. See **Special Tools and Equipment**.
9. Remove the outer pinion bearing.
10. Remove the pinion preload shim(s).
11. Adjust the amount of pinion preload shim thickness by doing the following:

IMPORTANT: Removing approximately 0.0254 mm (0.001 in) of shim thickness will increase the rotating torque by approximately 71-89 N.m (8-10 lb in).

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- If the rotating torque is too low, remove the appropriate amount of shim thickness from the shim thickness pack using the guideline above.

  Measure each shim separately with a micrometer and add the thickness together to determine the total shim pack size.

  IMPORTANT: Adding approximately 0.0254 mm (0.001 in) of shim thickness will decrease the rotating torque by approximately 71-89 N.m (8-10 lb in).

- If the rotating torque is too high, add the appropriate amount of shim thickness to the shim thickness pack using the guideline above.

  Measure each shim separately with a micrometer and add the thickness together to determine the total shim pack size.

42. Install the new pinion preload shim pack onto the drive pinion.
43. Install the drive pinion with the inner pinion bearing and the pinion preload shims into the axle housing.
44. Install the outer pinion bearing.
45. Install the thrust washer.
46. 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.
47. Install the pinion yoke nut washer.
48. Install the pinion yoke nut.

    Tighten: Tighten the pinion yoke nut to 252 N.m (186 lb ft).

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

    Specification: The rotating torque of the drive pinion should be between 2.3-5.1 N.m (20-45 lb in).

50. If the rotating torque of the drive pinion is not within specification, adjust the pinion bearing preload shim pack as necessary following the steps above.
51. If the rotating torque is within specifications, install the **J 8614-01** to the pinion yoke.
52. Remove the pinion nut while holding the **J 8614-01** .

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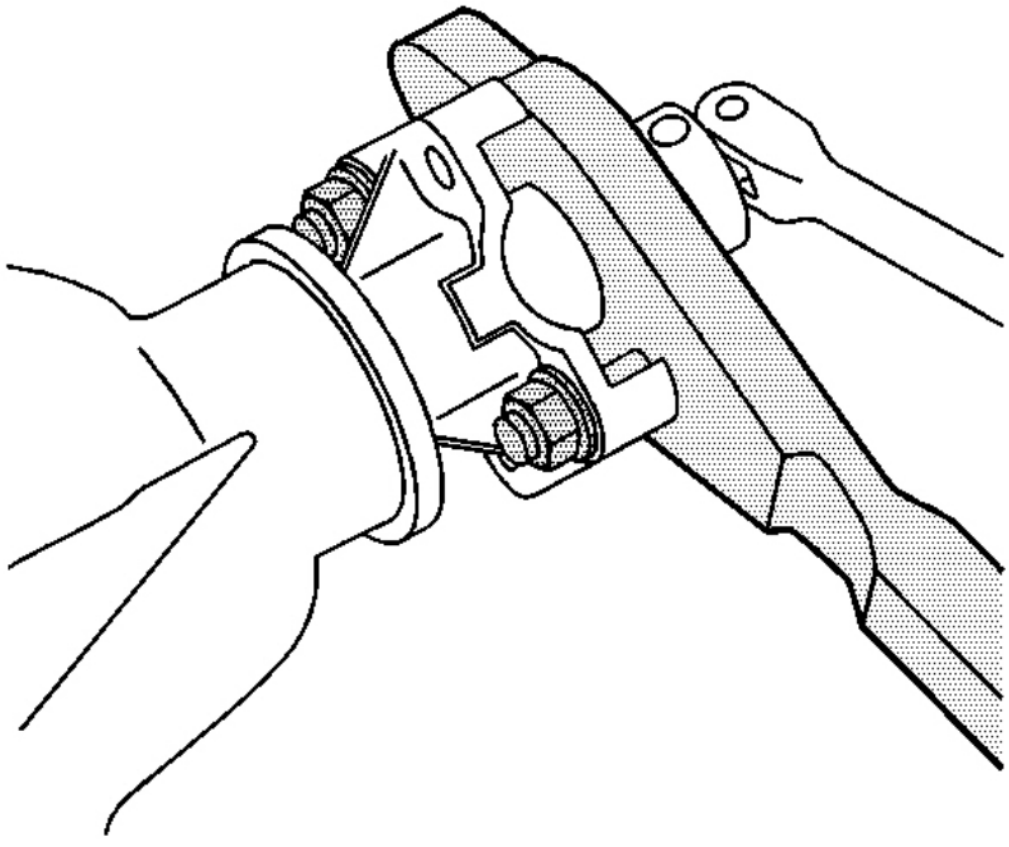


Fig. 249: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

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

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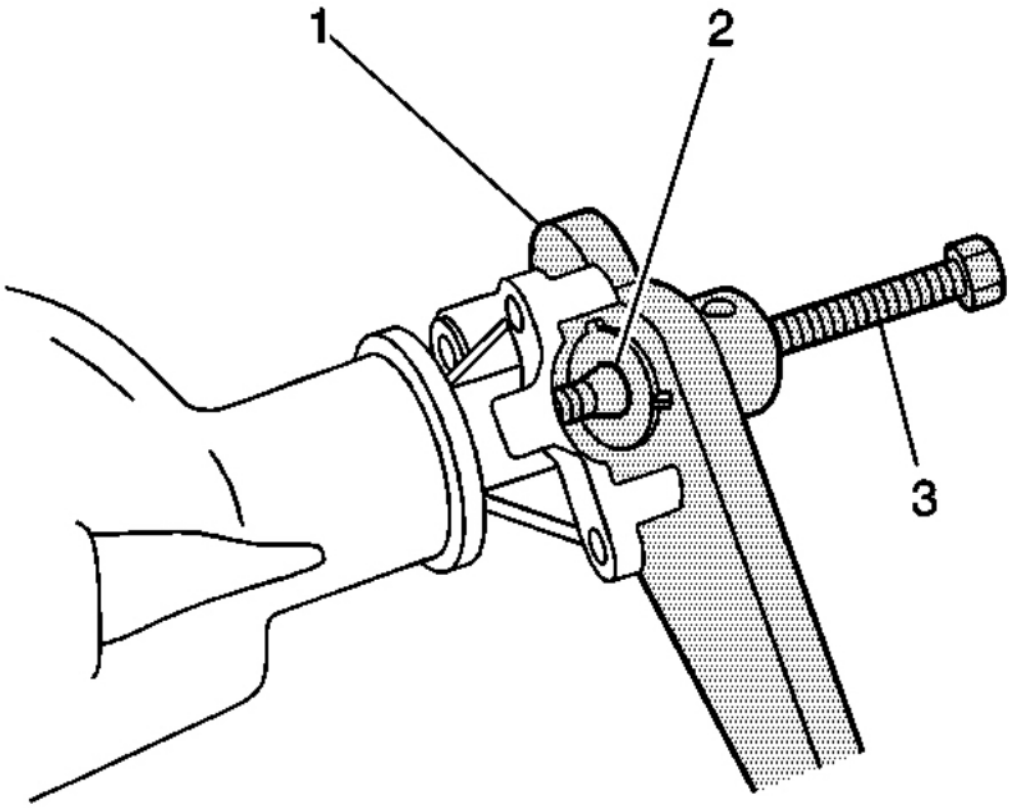


Fig. 250: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS CORP.

56. Apply a light coat of axle lubricant, GM P/N 12378557 or equivalent meeting GM Specification 9986207, to lip of the pinion seal.
57. Install the new pinion oil seal using the **J 45710** . See **Special Tools and Equipment**.

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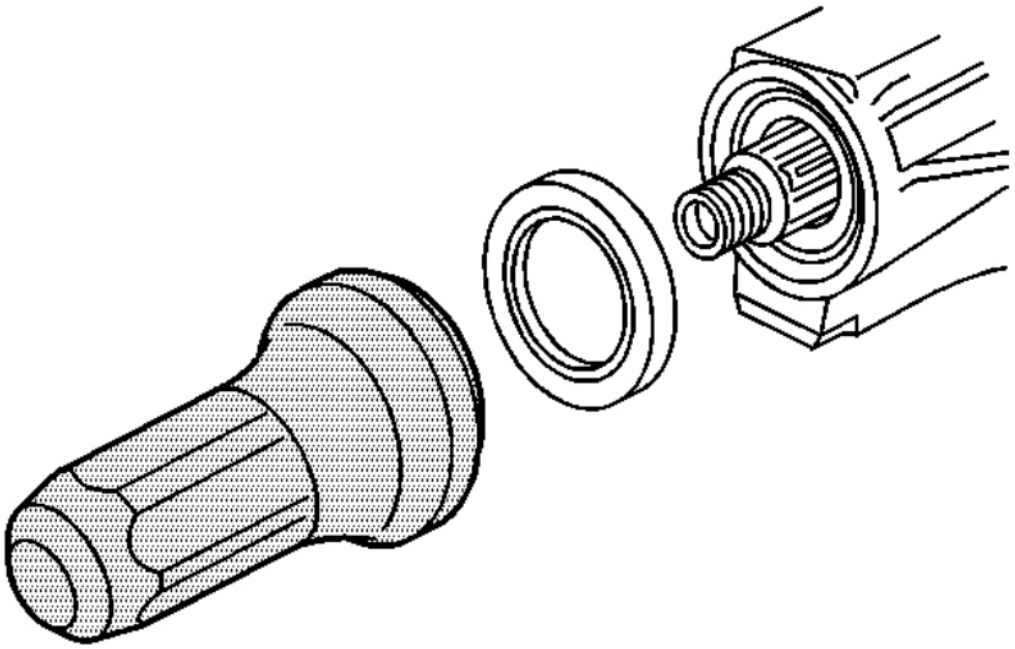


Fig. 251: Installing Pinion Oil Seal
Courtesy of GENERAL MOTORS CORP.

58. 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.
59. Install the pinion yoke nut washer.
60. Install the new pinion yoke nut.

Tighten: Tighten the pinion yoke nut to 370 N.m (272 lb ft).

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

Specification: The rotating torque of the drive pinion should be between 2.3-5.1 N.m (20-45 lb in).

Pinion Marking Table

Pinion Marking	Increase/Decrease the Distance Between Ring Gear Marking And Pinion Head	Increase/Decrease the Shim Pack Thickness
Positive (+)	Must Increase	Decrease
Negative (-)	Must Decrease	Increase
Zero (0)	OK	Use Nominal Setting

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PINION DEPTH ADJUSTMENT (10.5 INCH AXLE)

1. Install the differential, if necessary. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 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 in Cautions and Notices.

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 (9.75 Inch 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**.

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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 (9.75 Inch 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)

DETERMINING TOTAL SHIM PACK SIZE

Tools Required

- **J 8092** Universal Drive Handle - 3/4 in - 10. See **Special Tools and Equipment**.
- **J 24430** Differential Side Bearing Installer
- **J 36597** Side Bearing Puller Pilot - 9.25 in
- **J 45900** Differential Side Bearing Installer - Dana Axles

1. Remove the differential side bearing shims. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.

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2. Determine the pinion position shim and the pinion preload shims, if necessary. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.
3. Install the differential side bearing without the side bearing shims by doing the following:
    1. In order to protect the differential case, install the **J 36597** in the case on the side opposite of the bearing installation.
    2. Install the differential side bearing.
    3. Install the **J 24430** or the **J 45900** (2) and the **J 8092** (1) over the differential side bearing. See **Special Tools and Equipment**.
    4. Drive the differential side bearing into position using the **J 24430** or the **J 45900** and the **J 8092** . See **Special Tools and Equipment**.

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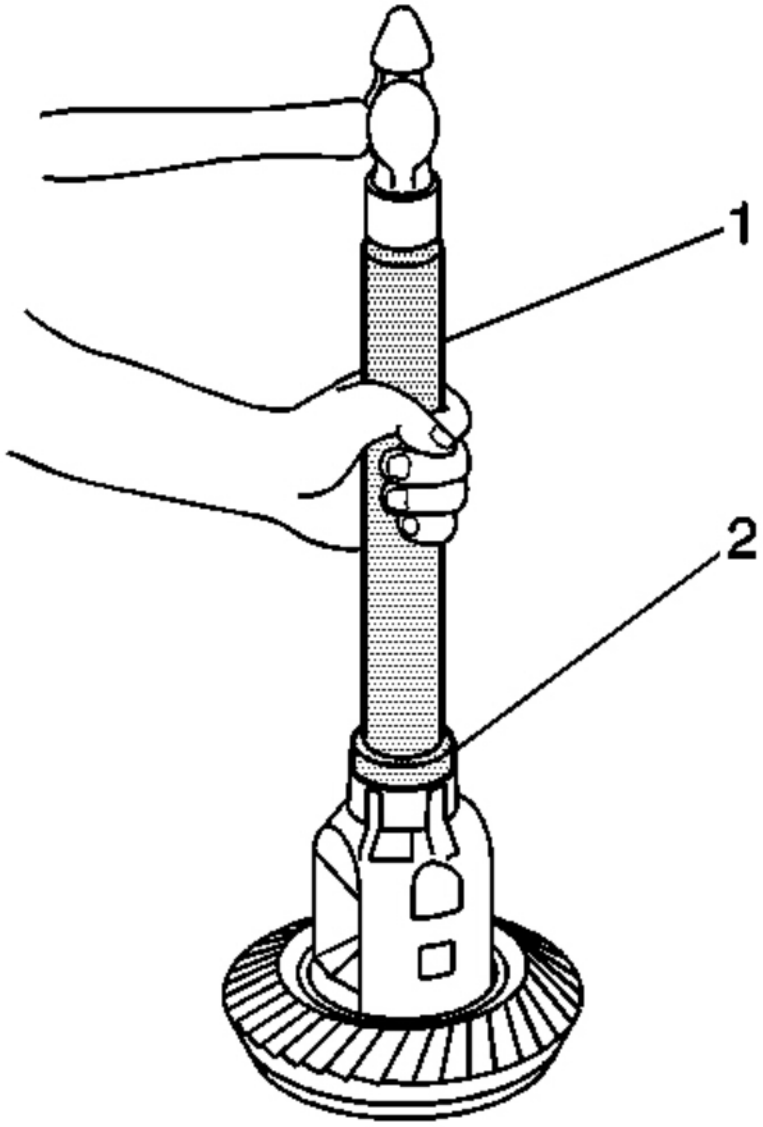


Fig. 252: Driving The Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS CORP.

4. Install the differential assembly into the axle housing.
5. Move the differential assembly to the left until the left differential side bearing is against the left side bearing bore.

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IMPORTANT: Install the bearing caps into the same position from which each was removed.

6. Install the left side bearing cap.

NOTE: Refer to Fastener Notice in Cautions and Notices.

7. Install the left side bearing cap bolts.

Tighten: Tighten the bearing cap bolts finger tight. Do not torque the bolts to specification at this time.

8. While holding the differential assembly against the left side bearing bore, press the right side bearing cup against the right differential side bearing.

IMPORTANT: In order to accurately measure the differential side bearing shim thickness, the differential side bearing cup must be evenly seated against the differential side bearing.

9. Using a feeler gauge, measure the distance between the right side bearing cup and the right side bearing bore. Use progressively larger feeler gauge sizes until a moderate drag is felt. Repeat this step several times while rotating the differential case in order to obtain a consistent reading.

This measurement, measurement a, is the total shim pack thickness for the differential assembly without preload.

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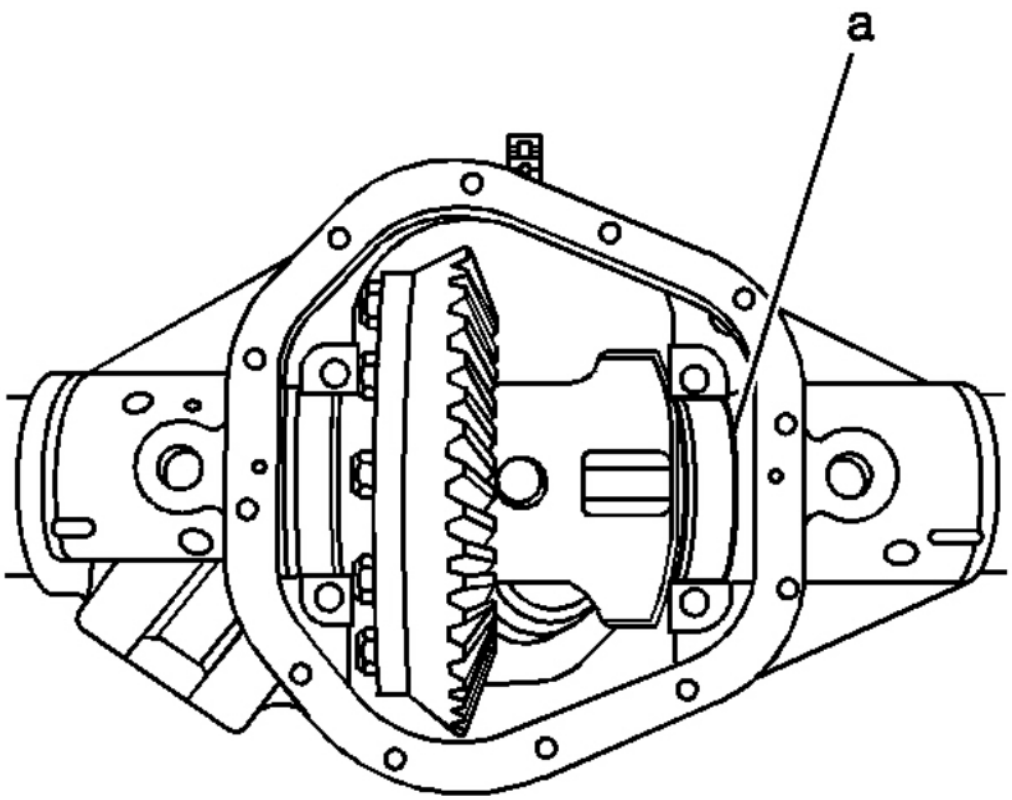


Fig. 253: Measuring Distance Between Right Side Bearing Cup & Bore
Courtesy of GENERAL MOTORS CORP.

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.

10. Remove the left side bearing cap bolts.
11. Remove the left side bearing cap.
12. Install the right side bearing cap.
13. Install the right side bearing cap bolts.

Tighten: Tighten the bearing cap bolts finger tight. Do not torque the bolts to specification at this time.

14. While holding the differential assembly ring gear against the drive pinion, press the left side bearing cup against the left differential side bearing.

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IMPORTANT: In order to accurately measure the differential side bearing shim thickness, the differential side bearing cup must be evenly seated against the differential side bearing.

15. Using a feeler gauge, measure the distance between the left side bearing cup and the left side bearing bore. Use progressively larger feeler gauge sizes until a moderate drag is felt. Repeat this step several times while re-positioning the differential case in order to obtain a consistent reading.

    This measurement, measurement b, is the left side shim pack thickness for the differential assembly without preload.

16. In order to determine the right side shim pack thickness, subtract the left side measurement, measurement b, from the total shim pack measurement, measurement a.

    This measurement is the thickness for the right side shim pack without preload or setting the initial backlash.

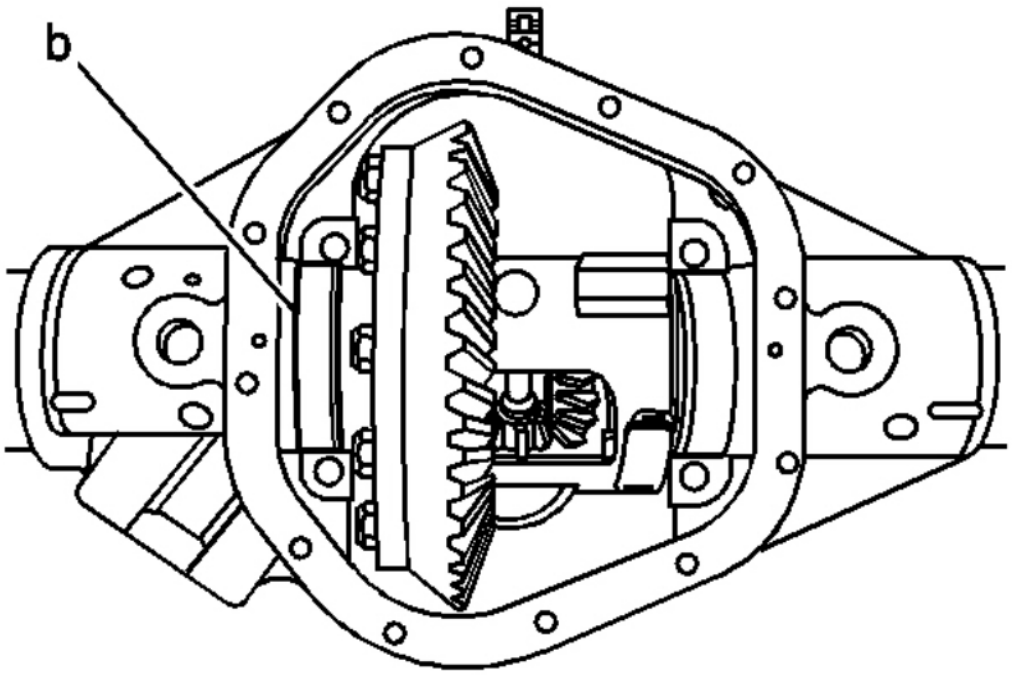


Fig. 254: Measuring Distance Between Left Side Bearing Cup & Bore
Courtesy of GENERAL MOTORS CORP.

17. Remove the right side bearing cap bolts.

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18. Remove the right side bearing cap.
19. Remove the differential assembly.
20. Determine the differential side bearing preload. Refer to **Differential Side Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.5 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.75 Inch Axle)** or **Differential Side Bearing Preload Adjustment (10.5 Inch Axle)**.

DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT (8.6 INCH AXLE)

Wedge Method

Tools Required

- **J 22779** Side Bearing Backlash Gage. See **Special Tools and Equipment**.
- **J 25588** Side Bearing Shim Installer

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 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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.

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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.

   The **J 22779** must be installed between the service spacer and the differential side bearing cup. See **Special Tools and Equipment**.

IMPORTANT: Over-tightening of the J 22779 may spread the housing and result in incorrect shim selection.

8. Tighten the knob on the **J 22779** until there is moderate drag when the **J 22779** is moved. See **Special Tools and Equipment**.
9. Remove the **J 22779** . See **Special Tools and Equipment**.
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. Calculate the average of the 3 measurements. Record the measurement. See **Special Tools and Equipment**.
13. Add the thickness of the service spacer, measured in Step 11 to the average thickness of the **J 22779** , measured in Step 12. The resulting value is the total service shim thickness without preload for the axle. See **Special Tools and Equipment**.
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. The **J 22779** must be installed between the service spacer and the differential side bearing cup. See **Special Tools and Equipment**.
16. While rotating the ring gear back and forth, tighten the knob on the **J 22779** until there is approximately 0.025-0.051 mm (0.001-0.002 in) of backlash between the ring gear and the drive pinion. See **Special Tools and Equipment**.
17. Once the correct amount of backlash is obtained, remove the **J 22779** . See **Special Tools and Equipment**.
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. Calculate the average of the 3 measurements. This value is the left side service shim thickness without preload. See **Special Tools and Equipment**.
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

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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. The service shim must be installed between the service spacer and the differential side bearing cup. See **Special Tools and Equipment**.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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: The rotating torque of the drive pinion and differential side bearings should be approximately 3.9-6.2 N.m (30-55 lb in) for new bearings or 2.8-5.1 N.m (25-45 lb in) for used bearings.

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 33. 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 (9.75 Inch 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**.

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Shim Method

Tools Required

J 25588 Side Bearing Shim Installer. See **Special Tools and Equipment**.

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 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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 Inch, 9.5 Inch Axle)** or **Drive Pinion and Ring Gear Replacement (9.75 Inch Axle)** 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.

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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. The service shim must be installed between the service spacer and the differential side bearing cup. See **Special Tools and Equipment**.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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: The rotating torque of the drive pinion and differential side bearings should be 3.9-6.2 N.m (30-55 lb in) for new bearings or 2.8-5.6 N.m (25-50 lb in) for used bearings.

    Record the measurement.

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23. Determine the preload for the differential side bearings by performing the following calculation:
    1. Subtract the drive pinion rotating torque, measured in Step 2, from the drive pinion and differential case side bearing rotating torque, measured in Step 22.
    2. Multiply the value obtained by the axle ratio. This value equals the preload for the differential side bearings.

    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 (9.75 Inch 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 SIDE BEARING PRELOAD ADJUSTMENT (9.5 INCH AXLE)

Tools Required

- **J 22779** Side Bearing Backlash Gage. See **Special Tools and Equipment**.
- **J 24429** Side Bearing Backlash Spanner

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.

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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 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 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 and Equipment**.

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 and Equipment**.
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 and Equipment**.
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.
13. Install the **J 22779** into the left side axle housing between the differential bearing bore and the differential bearing cup. See **Special Tools and Equipment**.

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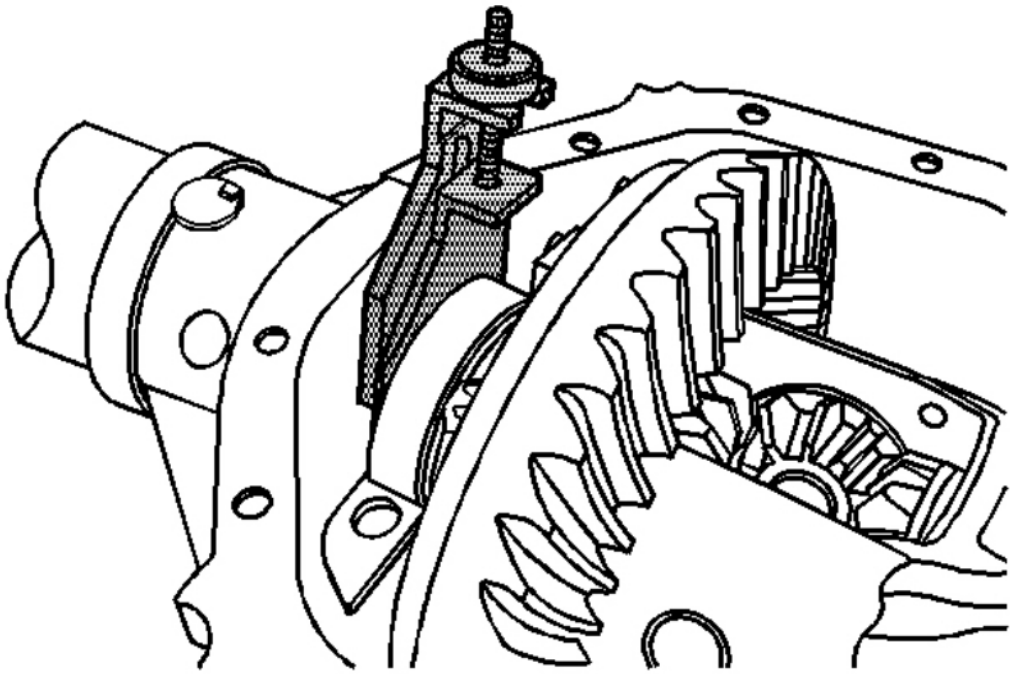


Fig. 255: Installing J 22779 Into Left Side Axle Housing Between Differential Bearing Bore & Cup
Courtesy of GENERAL MOTORS CORP.

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 and Equipment**.
15. Remove the **J 22779** . See **Special Tools and Equipment**.
16. Measure the **J 22779** in 3 locations. See **Special Tools and Equipment**.
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

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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 and Equipment**.
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 and Equipment**.
27. Tighten the differential bearing adjuster nut using the **J 24429** until the differential bearing adjuster nut contacts the bearing. See **Special Tools and Equipment**.
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 and Equipment**.

    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 in Cautions and Notices.

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 3.9-6.2 N.m (30-55 lb in) for new bearings or 2.8-5.1 N.m (25-45 lb in) for used bearings.

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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, increase or decrease the shim thickness as necessary 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 (9.75 Inch 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)

DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT (9.75 INCH AXLE)

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Tools Required

- **J 24430** Differential Side Bearing Installer. See **Special Tools and Equipment**.
- **J 36597** Side Bearing Puller Pilot - 9.25 inch
- **J 45711** Differential Side Bearing Remover - Dana 248
- **J 45900** Differential Side Bearing Installer - Dana Axles
- **J 8092** Universal Driver Handle - 3/4 in - 10

Measurement and Adjustment Procedure

1. Remove the differential side bearing shims. Refer to **Drive Pinion Bearings Replacement (8.6, 9.5 Inch Axles)** or **Drive Pinion Bearings Replacement (9.75 Inch Axle)** or **Drive Pinion Bearings Replacement (10.5 Inch Axle)**.
2. Determine the pinion position shim and the pinion preload shims, if necessary. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.
3. Install the differential side bearing without the side bearing shims by doing the following:
    1. In order to protect the differential case, install the **J 36597** in the case on the side opposite of the bearing installation.
    2. Install the differential side bearing.
    3. Install the **J 24430** or the **J 45900** (2) and the **J 8092** (1) over the differential side bearing. See **Special Tools and Equipment**.
    4. Drive the differential side bearing into position using the **J 24430** or the **J 45900** and the **J 8092** . See **Special Tools and Equipment**.

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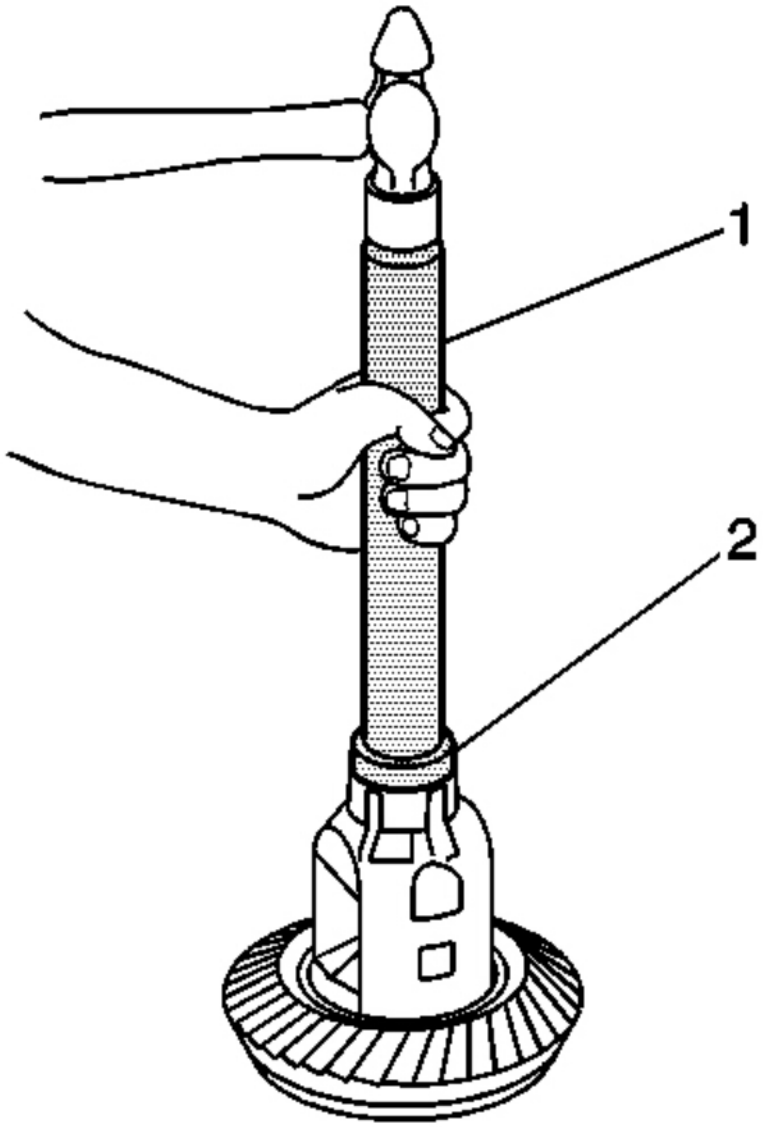


Fig. 256: Driving The Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS CORP.

4. Install the differential assembly into the axle housing.
5. Move the differential assembly to the left until the left differential side bearing is against the left side bearing bore.

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IMPORTANT: Install the bearing caps into the same position from which each was removed.

6. Install the left side bearing cap.

NOTE: Refer to Fastener Notice in Cautions and Notices.

7. Install the left side bearing cap bolts.

Tighten: Tighten the bearing cap bolts finger tight. Do not tighten the bolts to specification at this time.

8. While holding the differential assembly against the left side bearing bore, press the right side bearing cup against the right differential side bearing.

IMPORTANT: In order to accurately measure the differential side bearing shim thickness, the differential side bearing cup must be evenly seated against the differential side bearing.

9. Using a feeler gage, measure the distance between the right side bearing cup and the right side bearing bore. Use progressively larger feeler gage sizes until a moderate drag is felt. Repeat this step several times while rotating the differential case in order to obtain a consistent reading.

This measurement, measurement a, is the total shim pack thickness for the differential assembly without preload.

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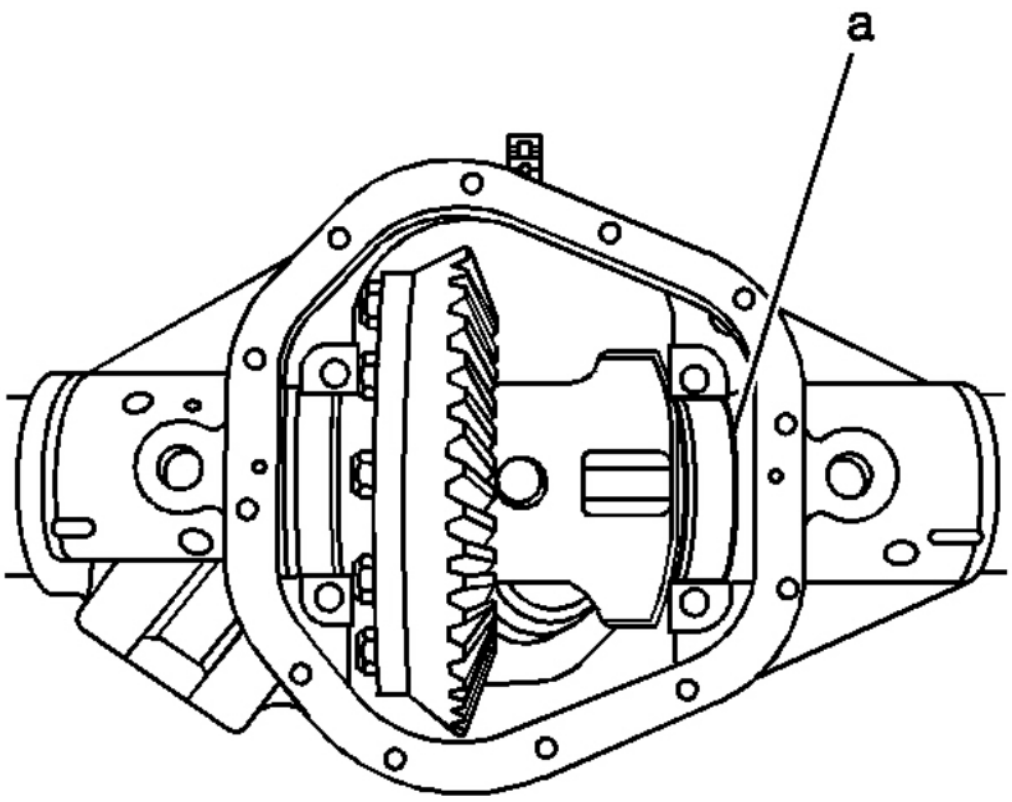


Fig. 257: Measuring Distance Between Right Side Bearing Cup & Bore
Courtesy of GENERAL MOTORS CORP.

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.

10. Remove the left side bearing cap bolts.
11. Remove the left side bearing cap.
12. Install the right side bearing cap.
13. Install the right side bearing cap bolts.

Tighten: Tighten the bearing cap bolts finger tight. Do not tighten the bolts to specification at this time.

14. While holding the differential assembly ring gear against the drive pinion, press the left side bearing cup against the left differential side bearing.

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IMPORTANT: In order to accurately measure the differential side bearing shim thickness, the differential side bearing cup must be evenly seated against the differential side bearing.

15. Using a feeler gage, measure the distance between the left side bearing cup and the left side bearing bore. Use progressively larger feeler gage sizes until a moderate drag is felt. Repeat this step several times while re-positioning the differential case in order to obtain a consistent reading.

    This measurement, measurement b, is the left side shim thickness for the differential assembly without preload.

16. In order to determine the right side shim thickness, subtract the left side measurement, measurement b, from the total shim measurement, measurement a.

    This measurement is the thickness for the right side shim thickness without preload or setting the initial backlash.

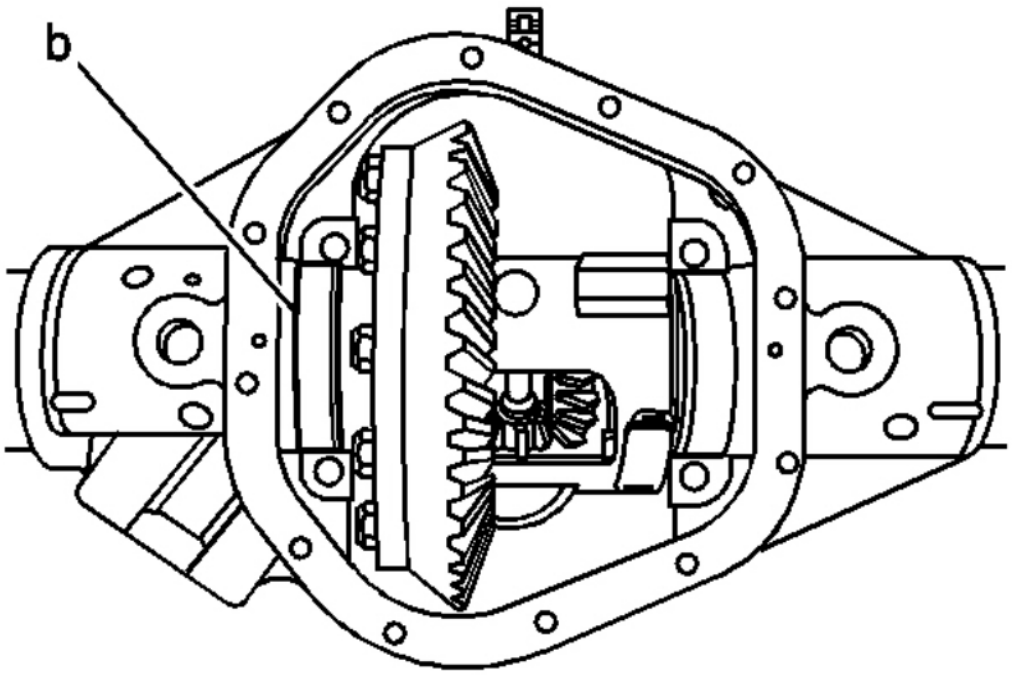


Fig. 258: Measuring Distance Between Left Side Bearing Cup & Bore
Courtesy of GENERAL MOTORS CORP.

17. Remove the right side bearing cap bolts.

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18. Remove the right side bearing cap.
19. Remove the differential assembly.
20. Remove the differential side bearings by performing the following steps:
    1. Install the **J 45711** (2) and the **J 36597** (1) as shown. See **Special Tools and Equipment**.
    2. Remove the differential side bearings using the **J 45711** and a hydraulic press. See **Special Tools and Equipment**.

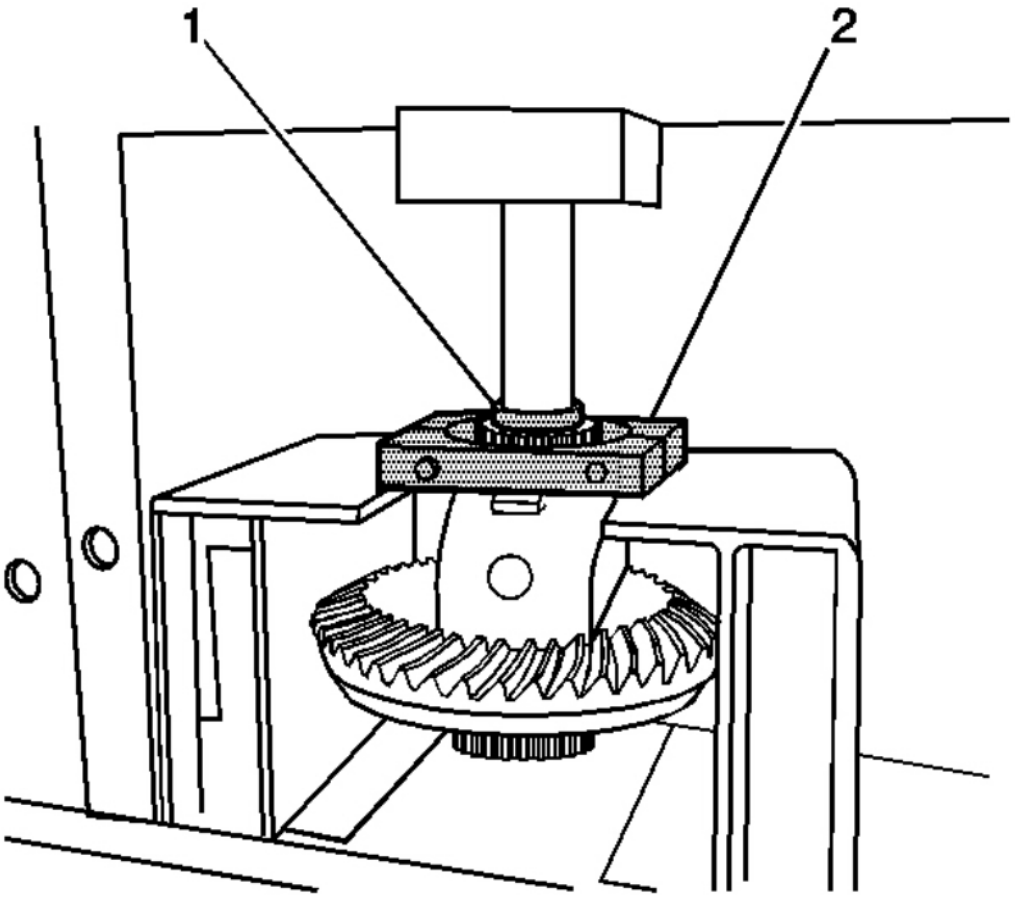


Fig. 259: Removing Differential Side Bearings Using J 45711 & J 36597
Courtesy of GENERAL MOTORS CORP.

21. Add 0.25 mm (0.010 in) of shim thickness to the right side shim thickness measurement determined in step 16.

    This additional amount will set the differential side bearing preload and the initial backlash.

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IMPORTANT: The number of shims required in order to equal the correct thickness may consist of one or more shims.

22. Install the right side shim thickness onto the differential case.

    Measure the shims one at a time. Add the measurements together in order to obtain the total thickness of the right side shim pack.

23. Install the right differential side bearing with the side bearing shim thickness by doing the following:
    1. In order to protect the differential case, install the J 8107-3 in the case on the side opposite of the bearing installation.
    2. Place the differential side shim thickness on top of the differential case.
    3. Place the differential side bearing on top of the differential case.
    4. Install the **J 24430** or the **J 45900** (2) and the **J 8092** (1) over the differential side bearing. See **Special Tools and Equipment**.
    5. Drive the differential side bearing into position using the **J 24430** or the **J 45900** and the **J 8092** . See **Special Tools and Equipment**.

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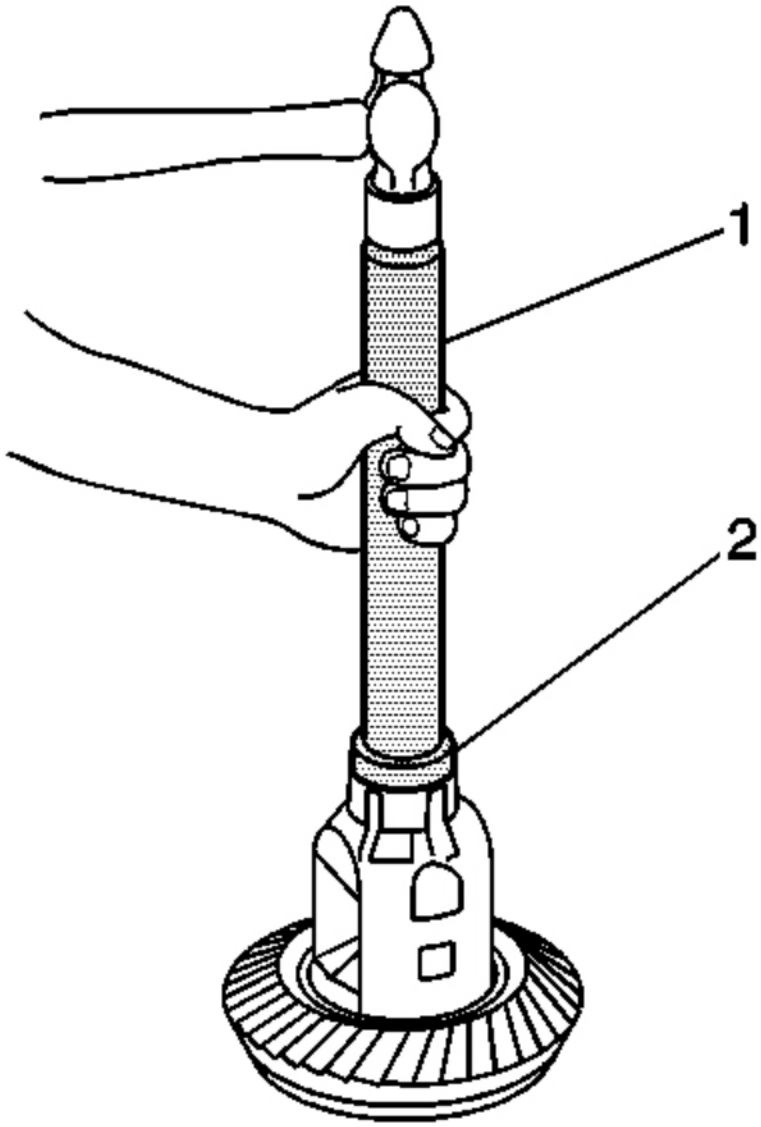


Fig. 260: Driving The Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The number of shims required in order to equal the correct thickness may consist of one or more shims.

24. Install the left side bearing shim thickness and differential side bearing using the steps above.

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25. Install the differential assembly into the axle housing. Refer to **Differential Replacement (8.6 Inch, 9.5 Inch Axles)** or **Differential Replacement (9.75 Inch Axle)** or **Differential Replacement (10.5 Inch Axle)**.
26. Adjust the backlash. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.

The differential side bearing shims are available in the following sizes:

Shim Sizes:

- 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)
- 1.02 mm (0.040 in)

DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT (10.5 INCH AXLE)

Tools Required

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

IMPORTANT: The rotating torque of the drive pinion must be within specifications before the pinion gear bearing retain or the differential case assembly can be installed.

1. Install the pinion gear bearing retainer assembly. Refer to **Drive Pinion Housing and/or Seal Replacement**.

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 prelubricated in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.

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2. Install the differential side bearings, if necessary. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.
3. 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. If the differential case assembly cannot be installed, turn the differential side bearing adjuster nuts into the axle housing until the differential case assembly until the proper clearance can be obtained.

4. Install the differential case assembly.
5. Install the differential bearing caps.
6. Install the differential bearing cap bolts.

IMPORTANT: In the following service procedure, DO NOT torque the bearing cap bolts, only finger tighten them.

7. Install the bearing cap bolts.

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).

IMPORTANT: 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. Check for zero backlash.
10. 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 and Equipment**.
11. 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 and Equipment**.
12. Back off the left adjusting nut approximately 2 slots using the **J 24429** in order to obtain the initial backlash adjustment. See **Special Tools and Equipment**.

IMPORTANT: In the following service procedure, DO NOT torque the adjuster nut lock bolt.

13. Install the left adjuster nut lock and the adjuster nut lock bolt.
14. Using the **J 24429** , tighten the right differential bearing adjuster nut until the differential case is in

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contact with the left differential adjuster nut. See **Special Tools and Equipment**.

15. Rotate the pinion several times in order to seat the bearings.
16. Loosen the right differential bearing adjuster nut using the **J 24429** until the nut is free from the differential side bearing. See **Special Tools and Equipment**.
17. Tighten the right differential bearing adjuster nut using the **J 24429** until the differential bearing adjuster nut contacts the bearing. See **Special Tools and Equipment**.
18. 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 and Equipment**.

    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.

19. Install the right differential bearing adjuster nut lock.

IMPORTANT: In the following service procedures, DO NOT torque the bolt at this time

20. Install the right differential bearing adjuster nut lock bolt.

NOTE: Refer to Fastener Notice in Cautions and Notices.

21. Tighten the bearing cap bolts.

    Tighten: Tighten the bearing cap bolts to 185 N.m (136 lb ft).

22. Tighten differential bearing adjuster nut lock bolts.

    Tighten: Tighten the differential bearing adjuster nut lock bolts to 27 N.m (20 lb ft).

23. Measure the ring gear to pinion backlash and adjust, if necessary. Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.

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.

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Adjustment Procedure

Tools Required

J 2222-C Wheel Bearing Nut Wrench. See **Special Tools and Equipment**.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the axle shaft. Refer to **Rear Axle Shaft and/or Gasket Replacement**.
3. Remove the hub adjuster nut retaining ring.

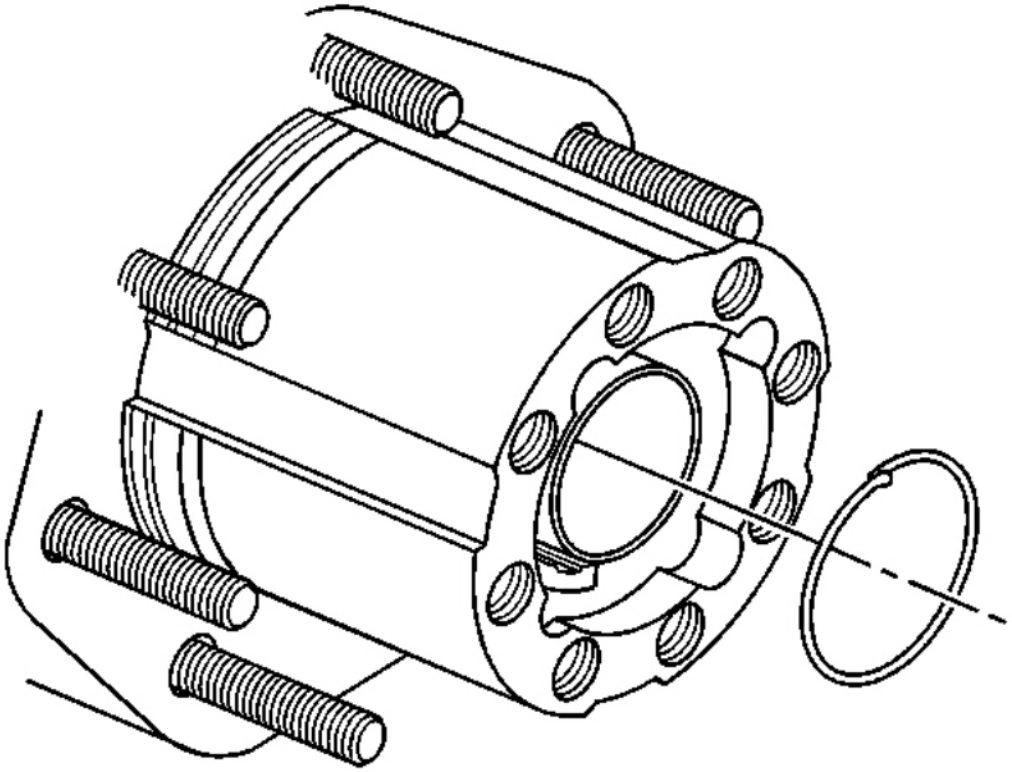


Fig. 261: Axle Nut Retaining Ring
Courtesy of GENERAL MOTORS CORP.

4. Remove the adjuster nut lock key.

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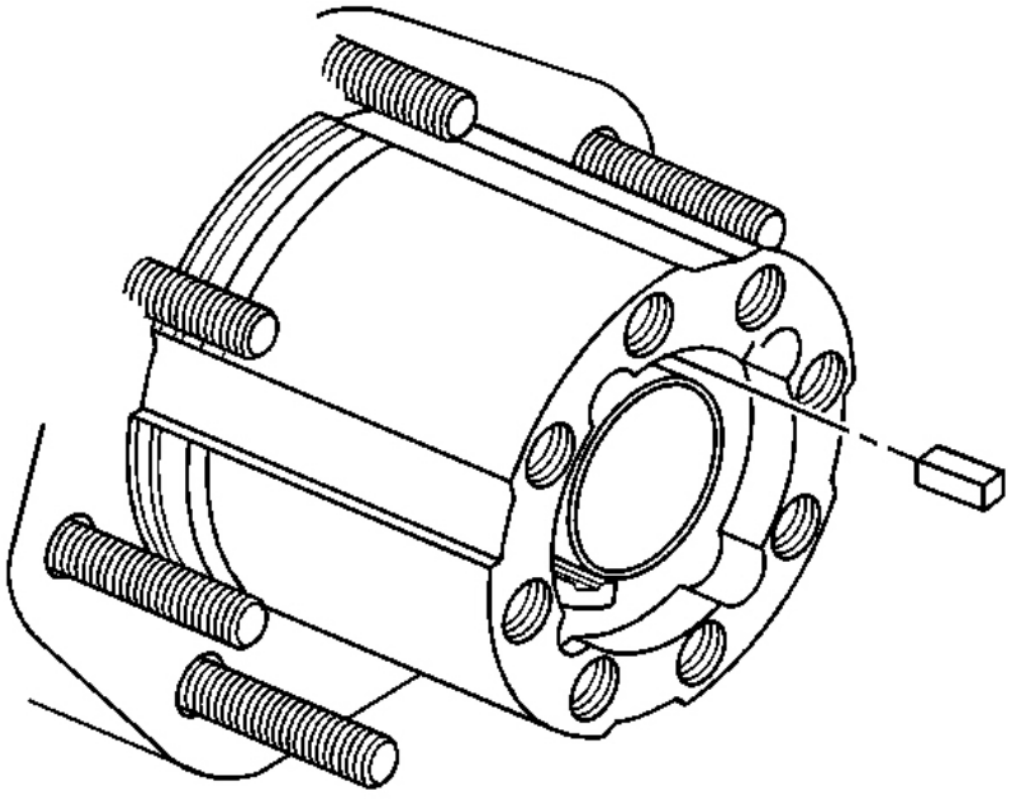


Fig. 262: Adjuster Nut Lock Key
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Tighten the wheel bearing adjusting nut using the **J 2222-C** . See **Special Tools and Equipment**.

   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).

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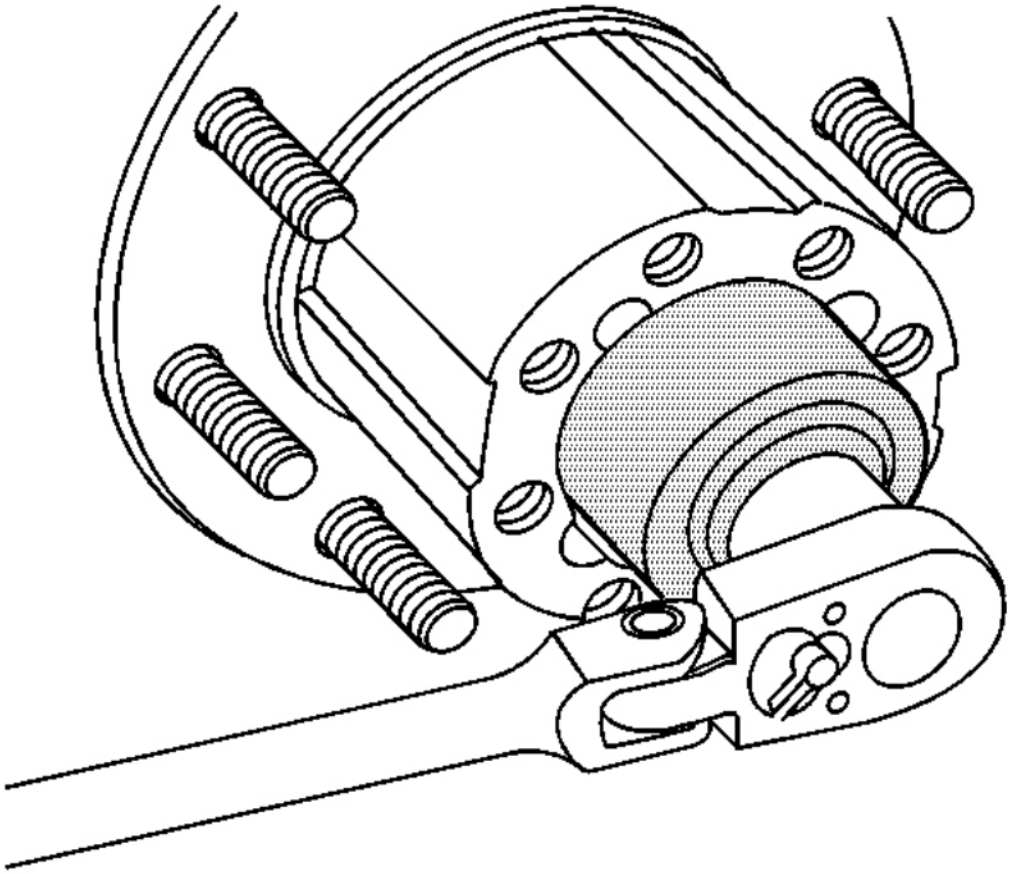


Fig. 263: View Of Adjusting Nut Using J 2222-C
Courtesy of GENERAL MOTORS CORP.

6. Turn the adjusting nut counterclockwise until the nut is loose using the **J 2222-C** . See **Special Tools and Equipment**.
7. Turn the adjusting nut clockwise until the nut contacts the bearing cone. Torque on the nut must be zero to finger tight.
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.

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- 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.

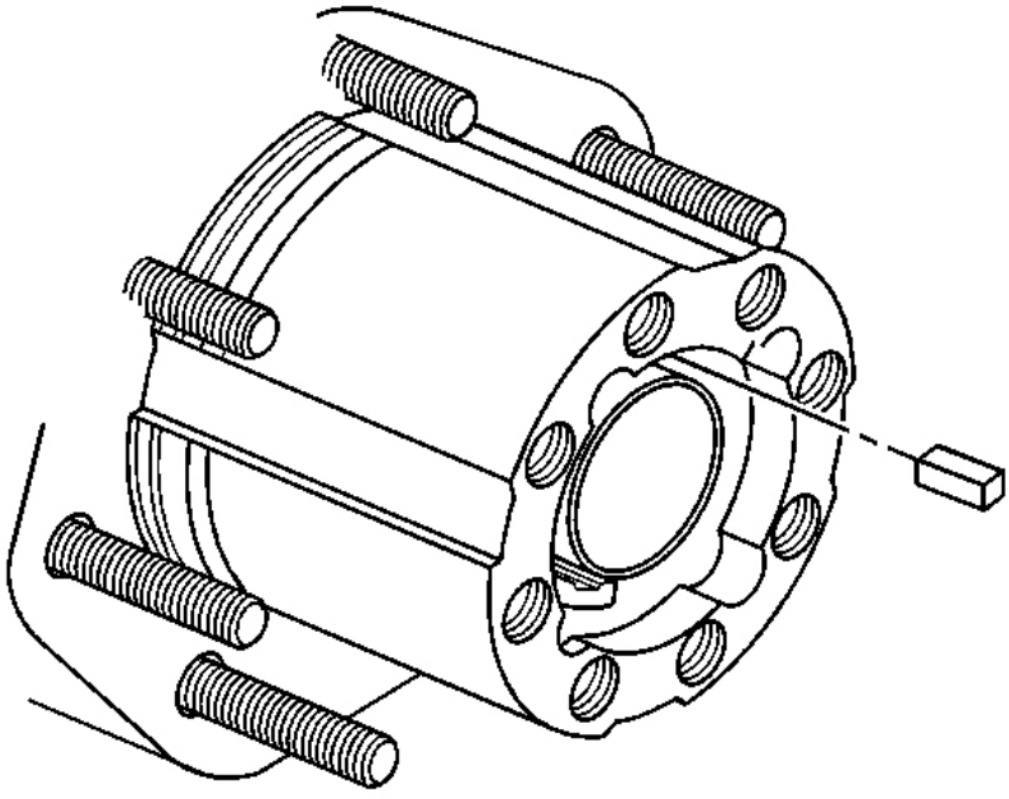


Fig. 264: Adjuster Nut Lock Key
Courtesy of GENERAL MOTORS CORP.

9. Install the retaining ring.

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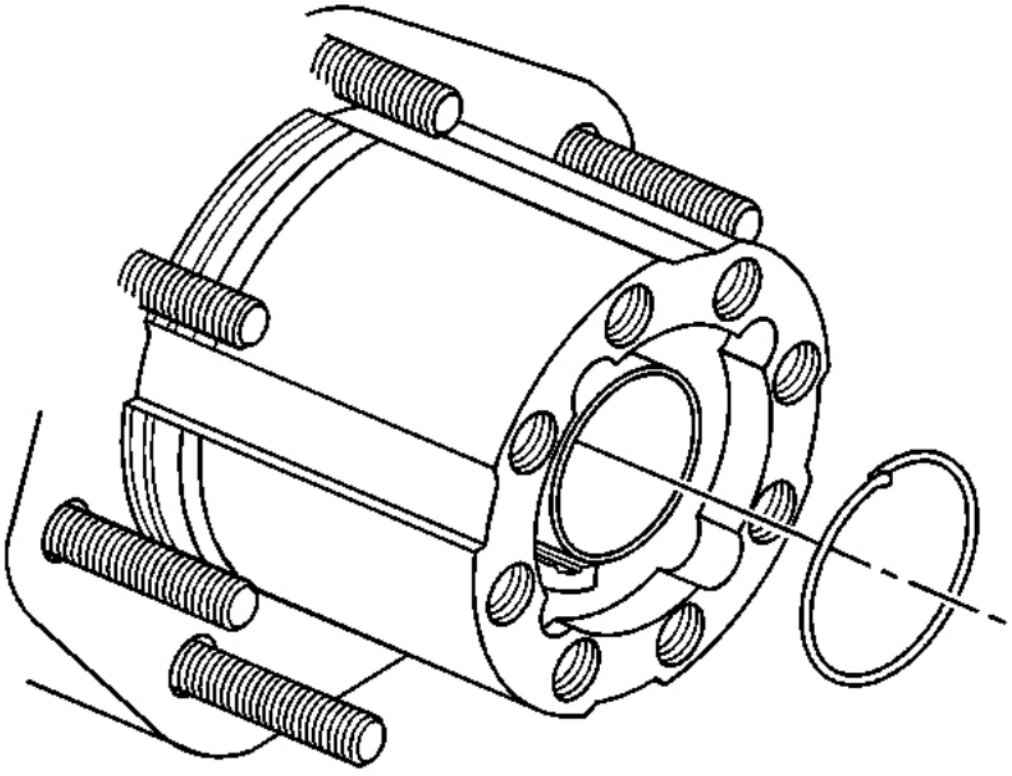


Fig. 265: Axle Nut Retaining Ring
Courtesy of GENERAL MOTORS CORP.

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 **Lubricant Level Inspection - Rear Drive Axle (8.6 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.5, 10.5 Inch Axle)** or **Lubricant Level Inspection - Rear Drive Axle (9.75 Inch Axle)**.
12. Lower the vehicle.

BACKLASH ADJUSTMENT (8.6 INCH AXLE)

Tools Required

- **J 8001** Dial Indicator Set. See **Special Tools and Equipment**.
- **J 25025** Guide Pins
- **J 25588** Side Bearing Shim Installer

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1. Install the J 25025-1 and the **J 8001** to the axle housing as shown.

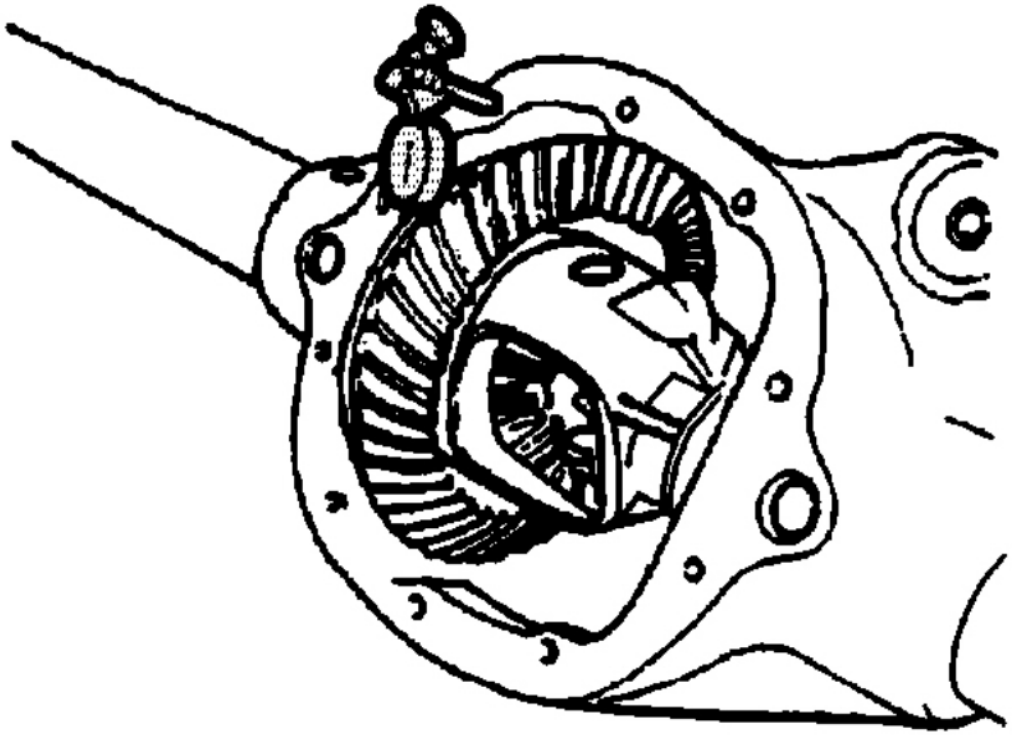


Fig. 266: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS CORP.

2. Place the indicator stem of the J 8001-3 at the heel end of a gear tooth.
3. Set the J 8001-3 so that the stem is aligned with the gear rotation and perpendicular to the tooth angle.
4. Preload the dial of the J 8001-3 .

   Align the needle and the dial face of the J 8001-3 to ZERO.

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).

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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

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(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.

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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.
14. Install the left side service shim or shims using the **J 25588** , if necessary. See **Special Tools and Equipment**.

    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 and Equipment**.

    The service shim or shims must be installed between the service spacer and the differential bearing cup.

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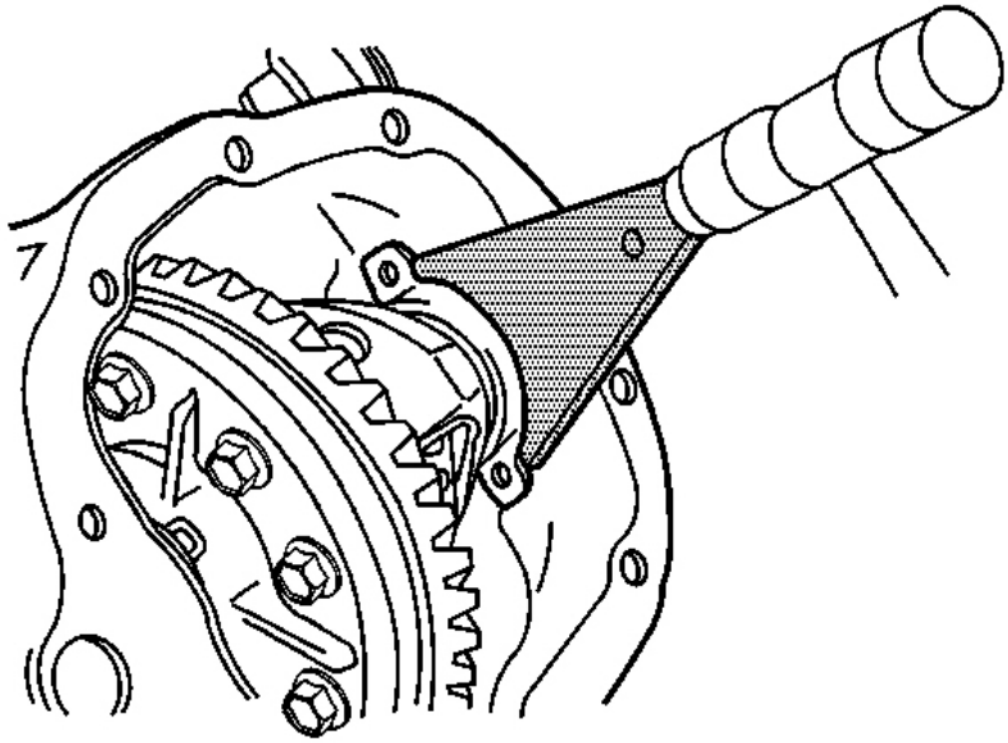


Fig. 267: Installing The Service Shim Using J 25588
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

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 (9.75 INCH AXLE)

Tools Required

- **J 25025** Guide Pins. See **Special Tools and Equipment**.

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- **J 8001** Dial Indicator

1. Determine the differential side bearing preload and initial backlash. Refer to **Differential Side Bearing Preload Adjustment (8.6 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.5 Inch Axle)** or **Differential Side Bearing Preload Adjustment (9.75 Inch Axle)** or **Differential Side Bearing Preload Adjustment (10.5 Inch Axle)**.
2. Install the **J 25025** (1) and the **J 8001** (2, 3) to the axle housing as shown. See **Special Tools and Equipment**.

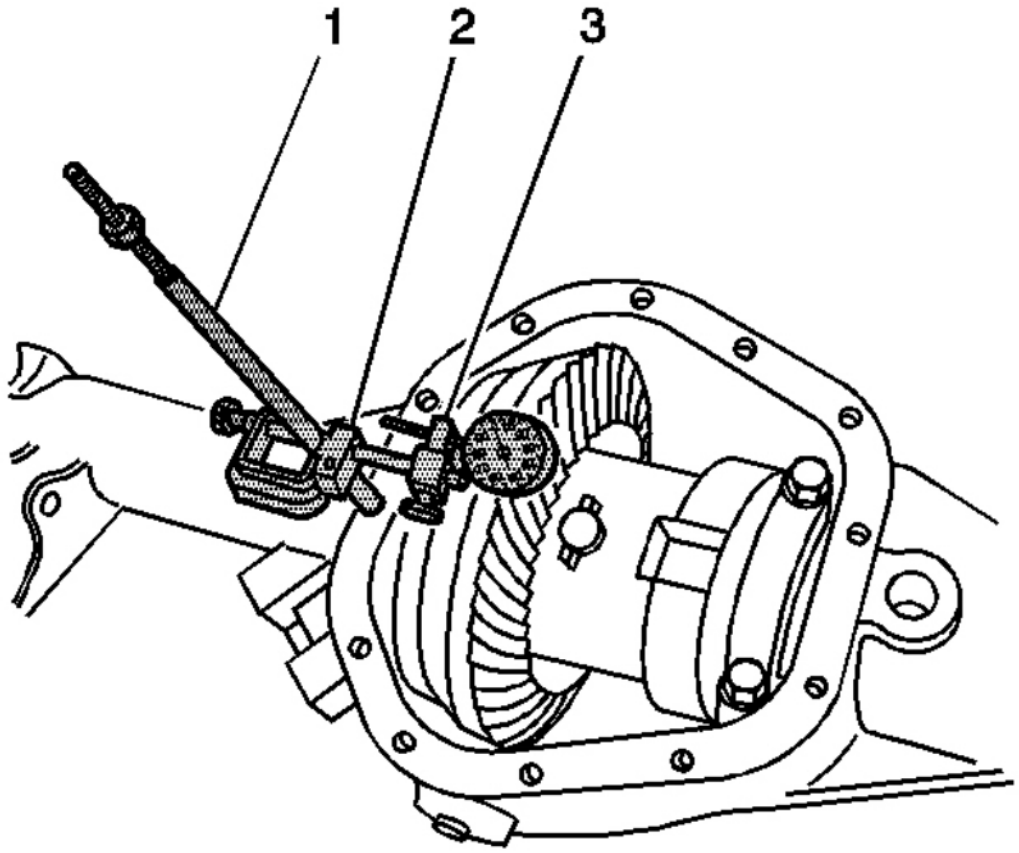


Fig. 268: Installing J 25025 & J 8001 To Axle Housing
Courtesy of GENERAL MOTORS CORP.

3. Place the indicator stem of the **J 8001** at the heel end of a gear tooth.
4. Set the **J 8001** so that the stem is aligned with the gear rotation and perpendicular to the tooth angle.
5. While holding the pinion stationary, move the ring gear back and forth.

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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 0.13-0.20 mm (0.005-0.008 in).

   IMPORTANT: 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.

9. If the backlash is not within specifications, adjust the backlash by doing the following:
   1. Remove the differential side bearings. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.
   2. If the backlash is too small, increase the backlash using the following procedure:

      IMPORTANT: Moving 0.05 mm (0.002 in) of shim thickness from one side of the differential to the other will change the backlash adjustment by 0.03 mm (0.001 in).

      1. Remove the appropriate amount of thickness from the left side shim pack. For example, to increase the backlash by 0.10 mm (0.004 in), subtract 0.20 mm (0.008 in) of thickness from the left side shim pack.
      2. Add the 0.20 mm (0.008 in) of shim thickness to the right side shim pack.
   3. If the backlash is too large, decrease the backlash using the following procedure:

      IMPORTANT: Moving 0.05 mm (0.002 in) of shim thickness from one side of the differential to the other will change the backlash adjustment by 0.03 mm (0.001 in).

      1. Remove the appropriate amount of thickness from the right side shim pack. For example, to decrease the backlash by 0.10 mm (0.004 in), subtract 0.20 mm (0.008 in) of thickness from the right side shim pack.
      2. Add the 0.20 mm (0.008 in) of shim thickness to the left side shim pack.

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10. Install the left and right shim packs onto the differential case.
11. Install the differential side bearings. Refer to **Differential Side Bearings Replacement (All Except 9.75 Inch Axle)** or **Differential Side Bearings Replacement (9.75 Inch Axle)**.
12. Recheck the backlash and adjust as necessary.
13. 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**.

GEAR TOOTH CONTACT PATTERN INSPECTION

The gear contact pattern check is not a substitute for adjusting the pinion depth and backlash. Use this method in order to verify the correct running position of the ring gear and the drive pinion. Gear sets which are not positioned properly may be noisy and/or have a short life span. A pattern check ensures that when best contact has been obtained between the ring gear and the drive pinion, the system will produce low noise and have a long life.

Drive Pinion and Ring Gear Identification

Production drive pinion and ring gears are manufactured by using a 2-cut or a 5-cut method. The 2-cut drive pinions and ring gears can be identified by having a groove cut into the outside edge of the ring gear and a ring on the stem of the drive pinion. The gear tooth contact patterns that are produced from each style of gear set differ slightly. A 2-cut gear will produce a pattern that is bias from the toe to the heel of the tooth (drive side), while a 5-cut gear set will produce a square pattern from the toe to the heel of the tooth (drive side). When diagnosing the gear tooth contact pattern, regardless of what type of gear set it is, a correct pattern will be centered within the area of the tooth, from toe to heel and from top to bottom.

Gear Tooth Nomenclature

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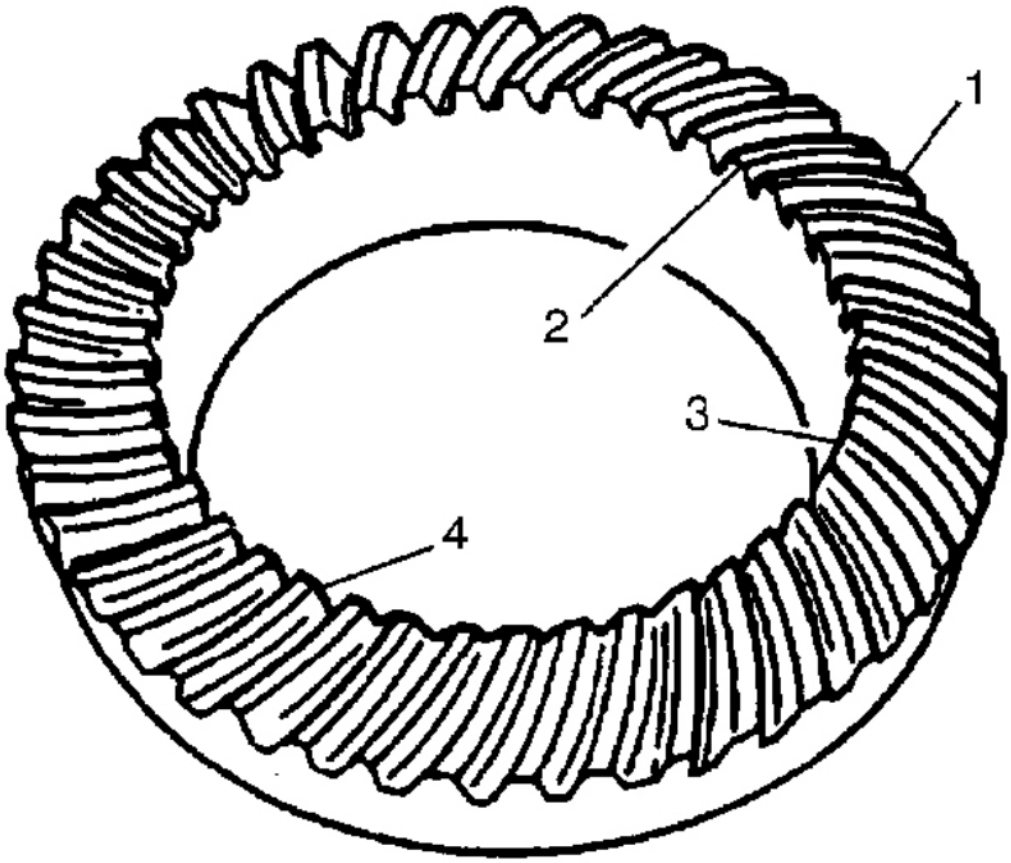


Fig. 269: Defining Gear Tooth Nomenclature
Courtesy of GENERAL MOTORS CORP.

The side of the ring gear tooth which curves outward, or is convex, is the drive side (4). The concave side is the coast side (3). The end of the tooth nearest the center of the ring gear is the toe end (2). The end of the tooth farthest away from the center is the heel end (1).

Adjustments Affecting Tooth Contact

The following 2 adjustments affect the tooth contact pattern:

- Backlash adjustment
- Pinion depth adjustment

The effects of bearing preloads are not readily apparent on hand-loaded tooth contact pattern tests. However, bearing preloads should be within specifications before proceeding with backlash and pinion depth adjustments.

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Backlash Adjustment

The backlash can be adjusted by either varying the thickness of the side bearing shims from side to side or by moving the adjuster sleeve(s) in or out, or both. By adjusting the shim thickness or moving the adjuster sleeve (s), the case and ring gear assembly will move closer to or further away from the pinion. In most cases, adjusting the backlash will correct an abnormal contact pattern. This adjustment will also be used to set the side bearing preload.

- If the thickness of the right shim is increased or the adjuster sleeve is moved in (if applicable), along with an equal decrease in the thickness of the left shim or the adjuster sleeve is moved out (if applicable), the backlash will increase.
- If the thickness of the left shim is increased or the adjuster sleeve is moved in (if applicable), along with an equal decrease in the thickness of the right shim or the adjuster sleeve is moved out (if applicable), the backlash will decrease.

Pinion Depth Adjustment

Adjust the position of the pinion by increasing or decreasing the distance between the pinion head and the centerline of the ring gear. Decreasing the distance moves the pinion closer to the centerline of the ring gear. Increasing the distance moves the pinion farther away from the centerline of the ring gear.

Testing Procedure

1. Wipe clean the differential case, the ring gear and the axle housing of lubricant. Carefully clean each tooth of the ring gear.
2. Use a medium stiff brush in order to sparingly apply gear marking compound, GM P/N 1052351 (Canadian P/N 10953497) or equivalent, to all of the ring gear teeth.

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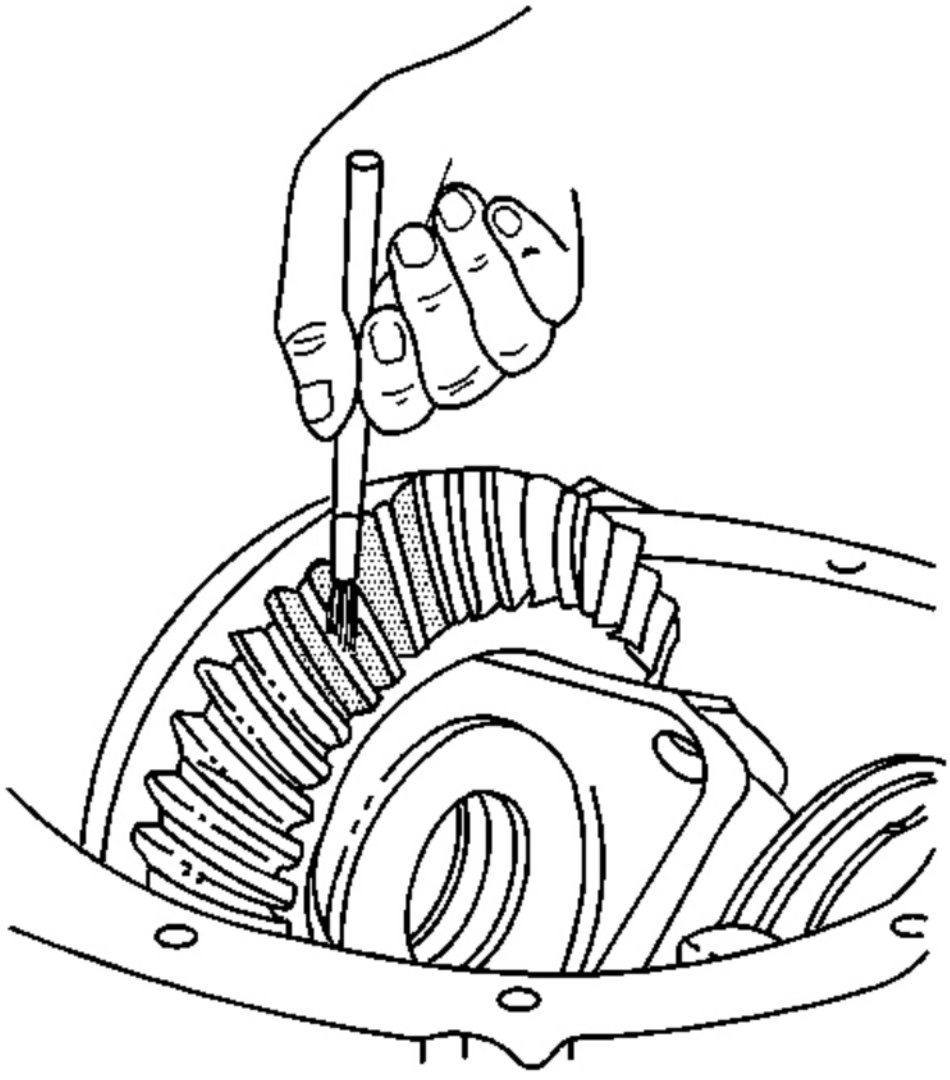


Fig. 270: Applying Gear Marking Compound To Ring Gear Teeth
Courtesy of GENERAL MOTORS CORP.

3. Torque the bearing caps bolts to specification.

IMPORTANT: Performing a test without loading the gears will not produce a satisfactory pattern.

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4. Apply the park brake until a torque load of 14 N.m (10 lb ft) is required in order to turn the pinion.

IMPORTANT: Avoid turning the ring gear excessively.

5. Using a wrench, turn the drive pinion flange/yoke so that the ring gear rotates 3 full revolutions.
6. Turn the drive pinion flange/yoke in the opposite direction so that the ring gear rotates 3 full revolutions in the opposite direction.
7. Observe the pattern on the ring gear teeth. Compare the pattern with the following illustrations.

Correct Contact Pattern

Condition

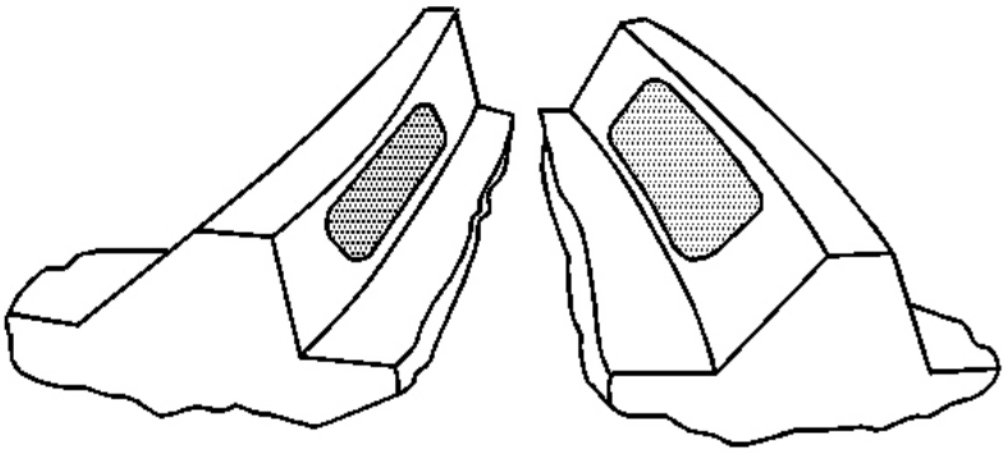


Fig. 271: Identifying Correct Gear Tooth Contact Pattern
Courtesy of GENERAL MOTORS CORP.

The backlash and pinion depth is correct.

Correction

None required.

Service Hints

Loose bearings on the drive pinion or in the differential case may cause patterns that vary. If the contact pattern varies, inspect the following preload settings:

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- Total assembly
- Differential case
- Pinion

If these settings are correct, inspect for damage or incorrectly assembled parts.

Drive Side Heel - Coast Side Toe Contact Pattern

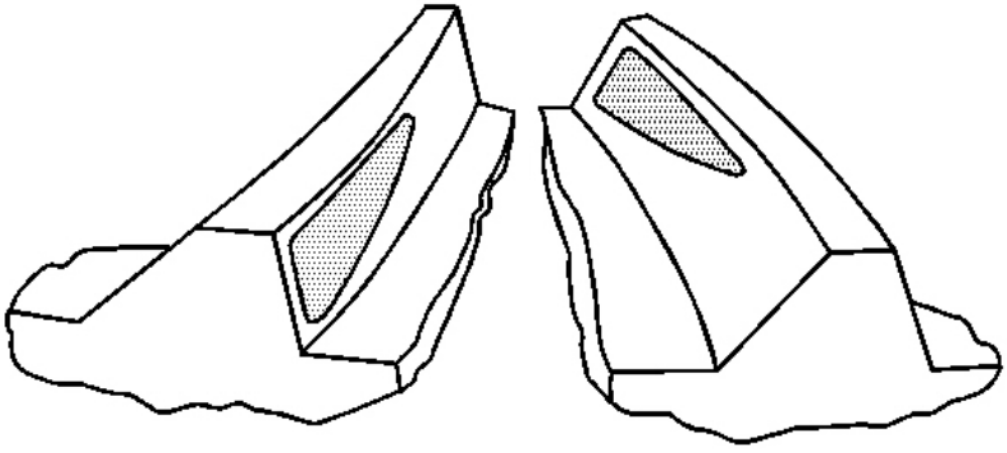


Fig. 272: Identifying Drive Side Heel - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The backlash is incorrect. The ring gear is too far away from the pinion.

Correction

Decrease the backlash. Move the ring gear closer to the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.

Drive Side Toe - Coast Side Heel Contact Pattern

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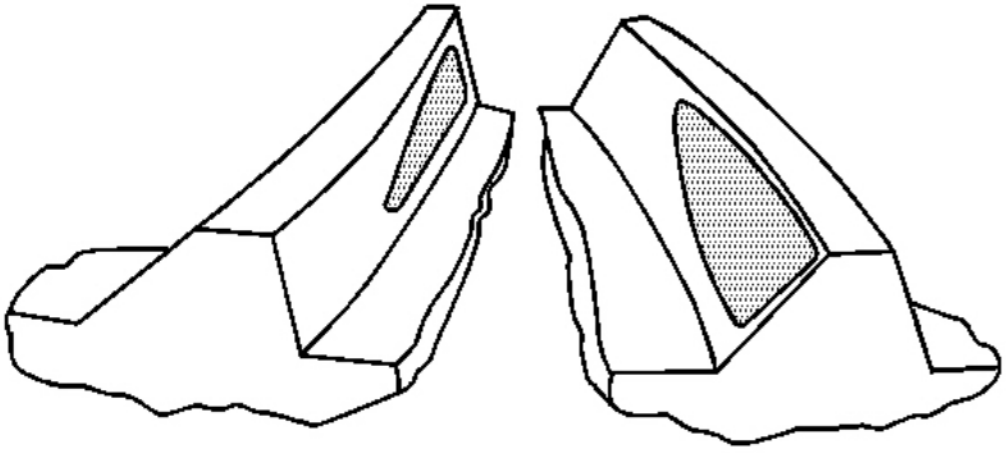


Fig. 273: Identifying Drive Side Toe - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The backlash is incorrect. The ring gear is too close to the drive pinion.

Correction

Increase the backlash. Move the ring gear away from the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.

Drive Side Heel - Coast Side Heel Contact Pattern

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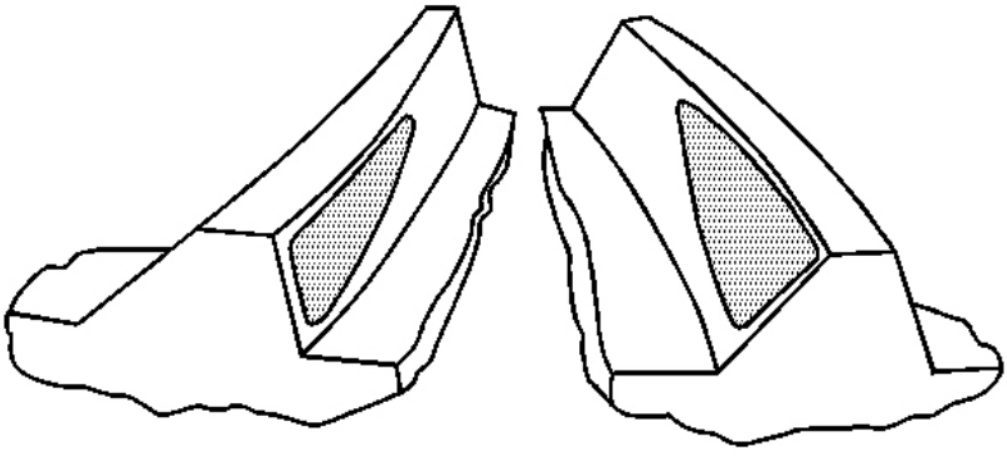


Fig. 274: Identifying Drive Side Heel - Coast Side Heel Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The backlash is incorrect. The ring gear is too far away from the pinion.

Correction

Decrease the backlash. Move the ring gear closer to the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.

Drive Side Toe - Coast Side Toe Contact Pattern

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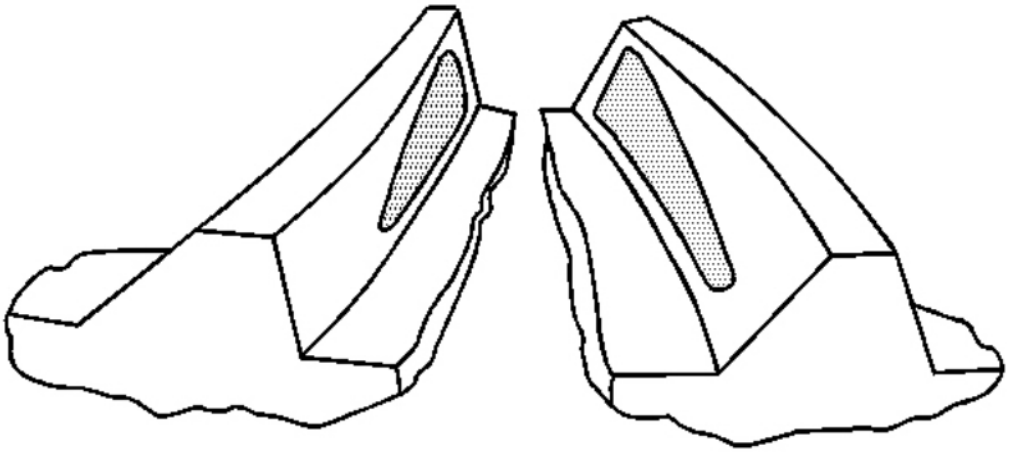


Fig. 275: Identifying Drive Side Toe - Coast Side Toe Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The backlash is incorrect. The ring gear is too close to the drive pinion.

Correction

Increase the backlash. Move the ring gear away from the pinion by adjusting the side bearing shim thickness or the adjuster sleeve(s). Refer to **Backlash Adjustment (8.6 Inch Axle)** or **Backlash Adjustment (9.75 Inch Axle)**.

High Flank Contact Pattern

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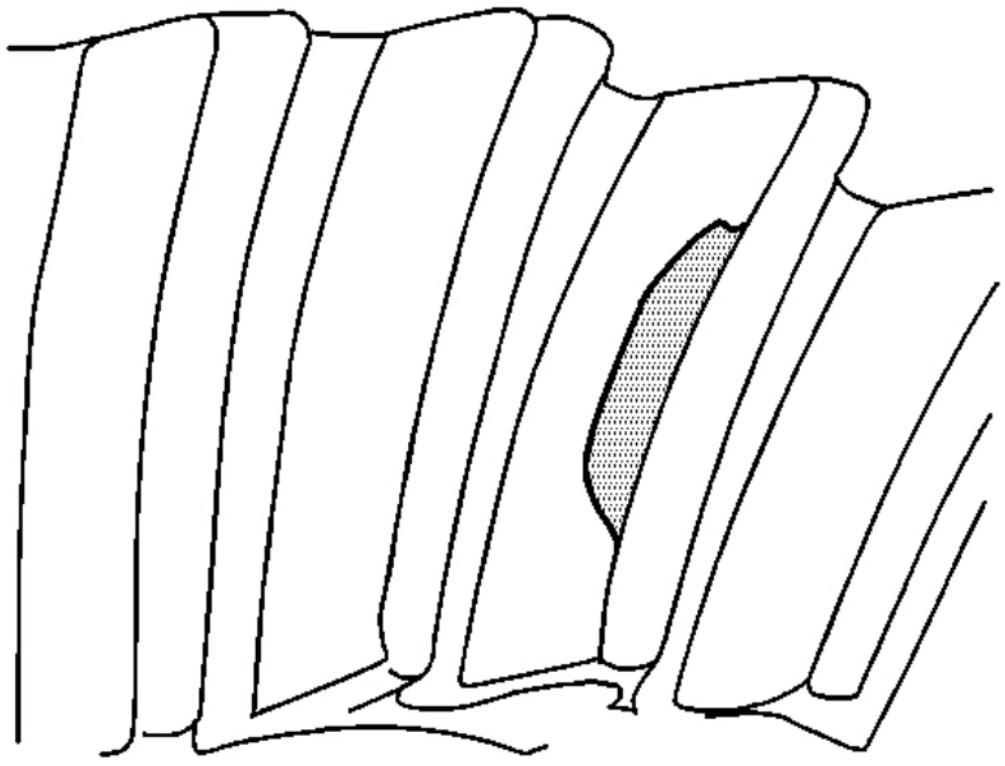


Fig. 276: Identifying High Flank Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The pinion depth is incorrect. The pinion gear is too far away from the ring gear.

Correction

Increase the pinion depth. Move the pinion gear closer to the ring gear by increasing the pinion shim thickness. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.

Low Flank Contact Pattern

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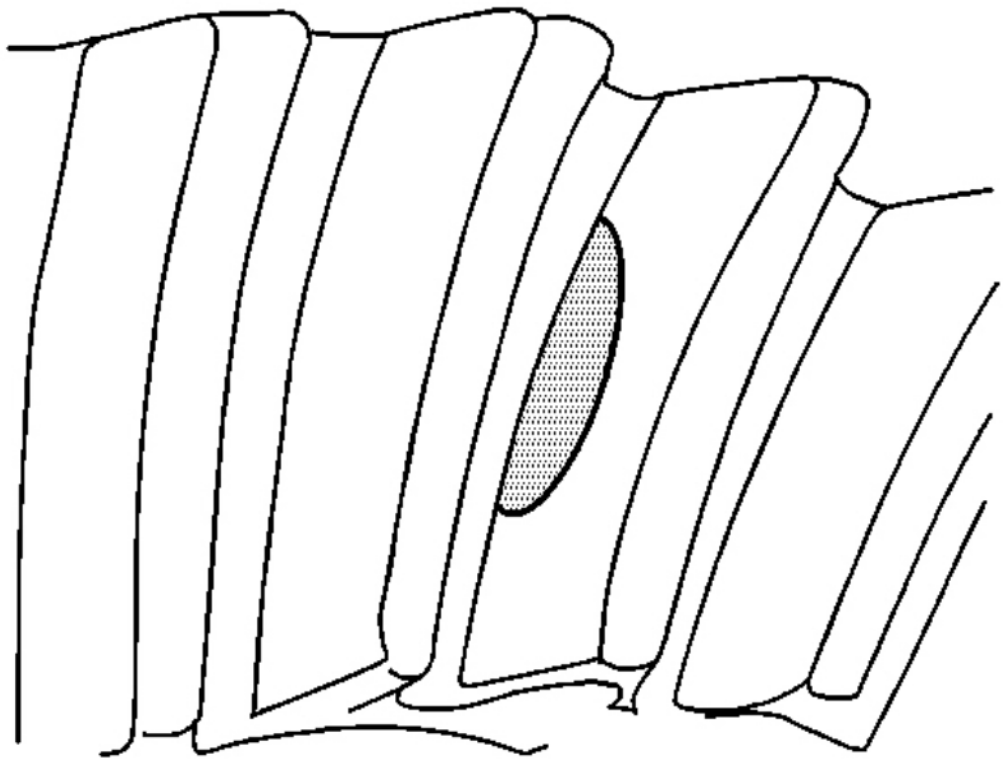


Fig. 277: Identifying Low Flank Contact Pattern
Courtesy of GENERAL MOTORS CORP.

Condition

The pinion depth is incorrect. The pinion gear is too close to the ring gear.

Correction

Decrease the pinion depth. Move the pinion gear away from the ring gear by decreasing the pinion shim thickness. Refer to **Pinion Depth Adjustment (8.6 Inch, 9.5 Inch Axles)** or **Pinion Depth Adjustment (9.75 Inch Axle)** or **Pinion Depth Adjustment (10.5 Inch Axle)**.

DESCRIPTION AND OPERATION

REAR DRIVE AXLE DESCRIPTION AND OPERATION

Rear Axles for this vehicle consist of the following components:

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- Differential Axle Housing
- Differential Carrier
- Right and left Axle tubes
- Right and left axle shafts

The 800 series utility vehicles use either the 8.60, 9.50 or the 10.50 inch axles. The type of the axle 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 the 8.60, 9.50 and 10.50 inch axles. The locking differential information for these rear axles can be located in the locking differential section.

A open differential has a set of 4 gears. 2 are side gears and 2 are pinion gears. Each side gear is splined to an axle shaft so each axle shaft; so each axle shaft turns when its 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 which is bolted to the differential case assembly. The differential pinion, as it rotates with 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 the input force on the pinion gear is equally divided between the 2 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. When the vehicle turns a corner the inner wheel turns slower than the outer wheel which slows the rear axles' side gear (as the shaft is splined to the side gear). The rear axle pinion gears will roll around the slower moving rear axle side gear; driving the rear axle side gear wheel faster.

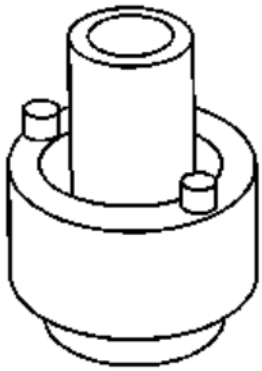
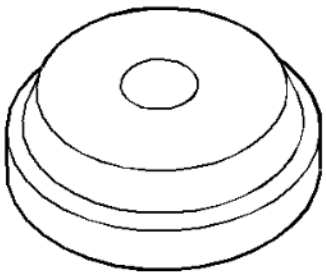
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

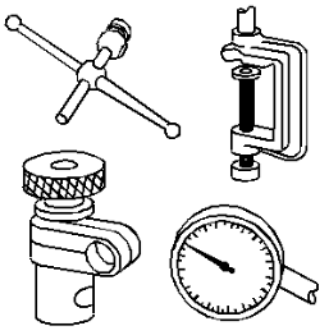
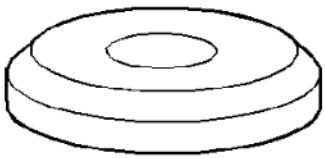
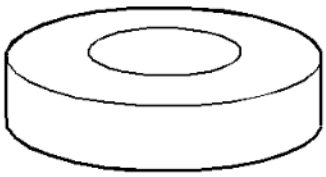
Special Tools

Illustration	Tool Number/Description
	J 2222-C Wheel Bearing Nut Wrench

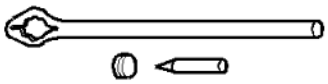
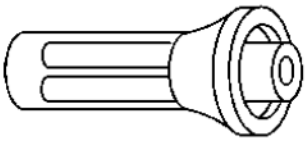
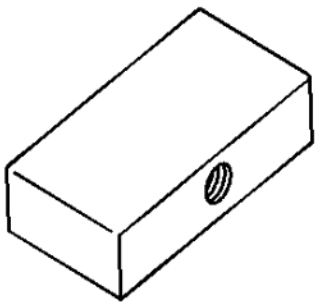
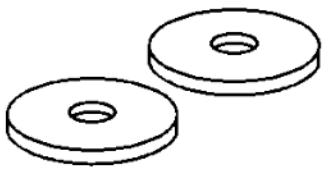
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	J 2619-01 Slide Hammer
	J 7818 Inner Bearing Race Installer
	J 8001 Dial Indicator Set

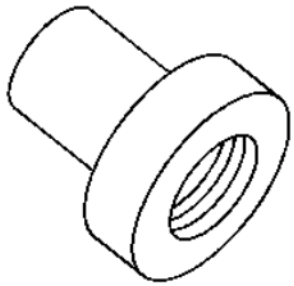
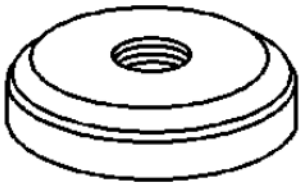
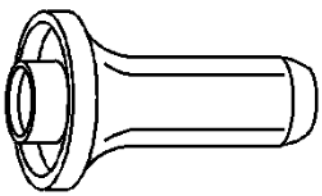
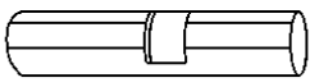
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	J 8092 Driver Handle - 3/4 in - 10
	J 8608 Rear Pinion Bearing Race Installer
	J 8611-01 Rear Pinion Bearing Race Installer

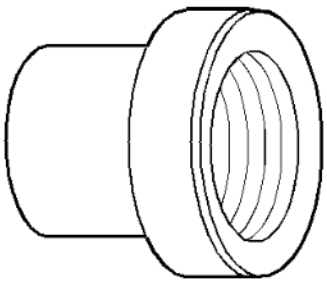
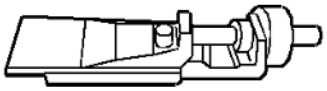
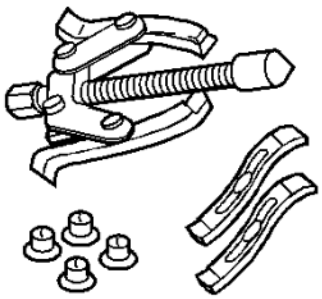
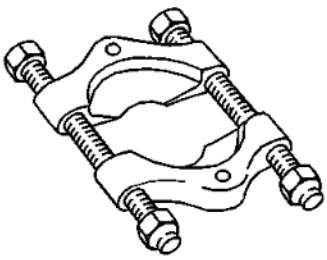
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	J 8614-01 Flange and Pulley Holding Tool
	J 21128 Axle Pinion Oil Seal Installer
	J 21777-85 Gage and Plate (9.5 in Axle)
	J 21777-86 Side Bearing Disc, 9.5 inch Axle, 2 Required
	J 21784 Side Bearing Installer

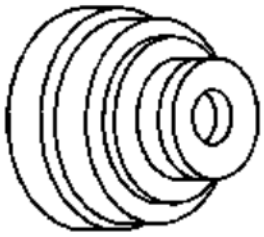
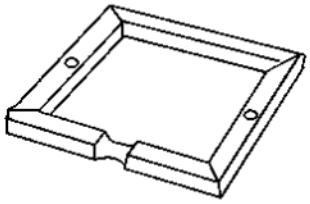
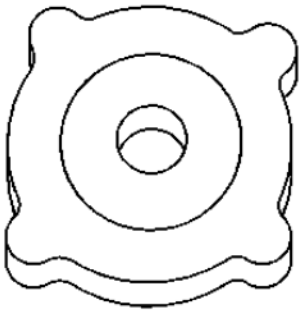
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	J 22306 Pinion Cup Bearing Installer - Rear
	J 22388 Pinion Oil Seal Installer - Rear
	J 22536 Pinion Driver

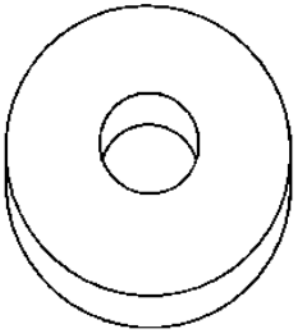
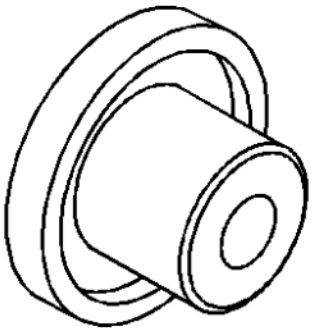
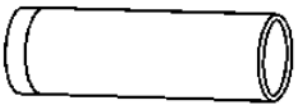
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	J 22761 Differential Side Bearing Installer
	J 22779 Side Bearing Backlash Gage
	J 22888-D Side Bearing Remover Kit
	J 22912-01 Split-Plate Bearing Puller

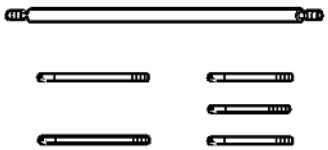
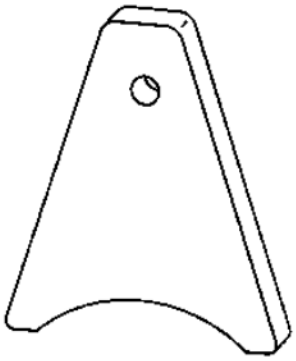
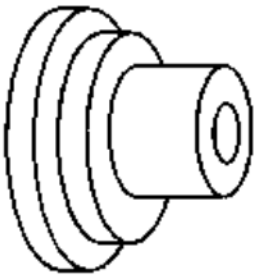
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	J 23690 Bearing Installer
	J 24385-01 Axle Housing Spreader
	J 24426 Wheel Bearing Race Installer - Outer

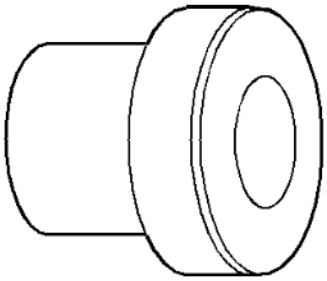
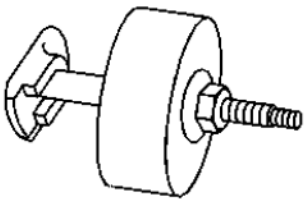
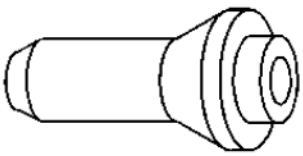
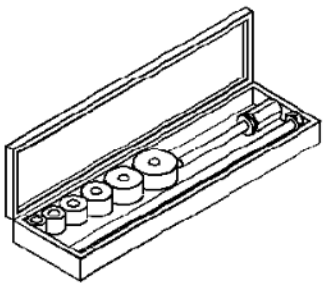
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	J 24427 Wheel Bearing Race Installer - Inner
	J 24429 Side Bearing Backlash Spanner
	J 24430 Differential Side Bearing Installer
	J 24433 Pinion Cone and Side Bearing Installer

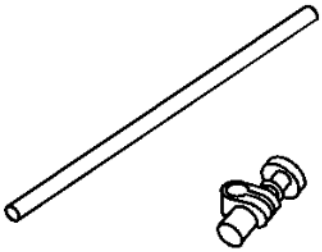
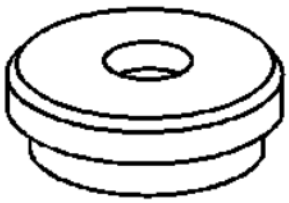
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	J 25025 Guide Pins
	J 25588 Side Bearing Shim Installer
	J 29709 Wheel Bearing Installer
	J 29710

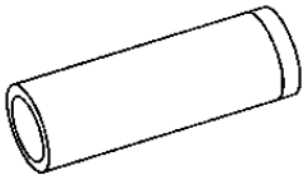
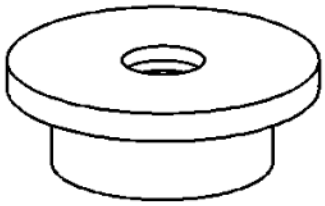
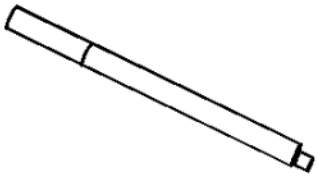
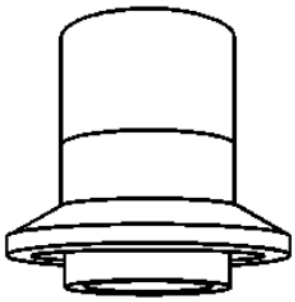
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	Differential Side Bearing Installer
	J 29712 Wheel Bearing Remover (9.5 inch Axle)
	J 29713 Axle Seal Installer (9.5 inch Axle)
	J 33049 Camshaft Bearing Service Set

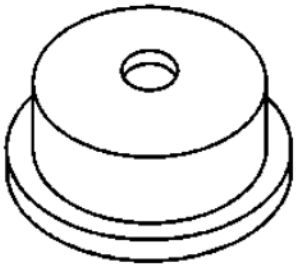
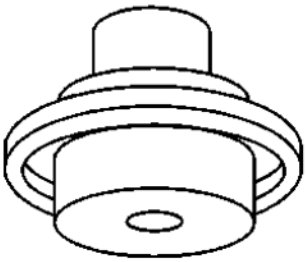
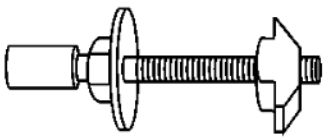
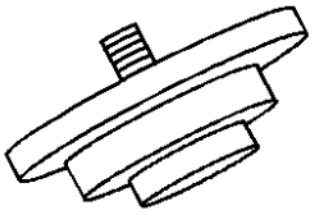
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	J 34925 Pinion Setting Gage and Components
	J 34178 Spreader Gage Adapter
	J 36597 Side Bearing Puller Pilot - 9.25 inch Axle
	J 36614 Inner Pinion Bearing Installer (9.5 inch Axle)

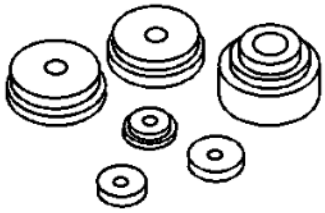
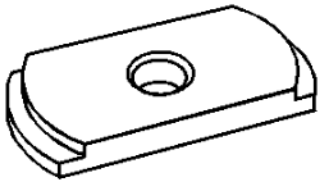
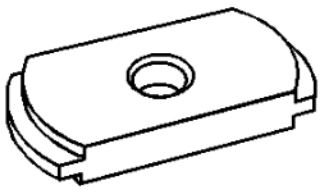
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	J 37624 Pinion Bearing Installer
	J 42176 Universal Driver Handle - Non-Threaded
	J 44414 Pinion Seal Installer

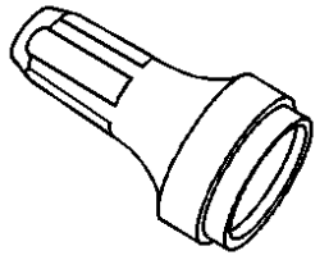
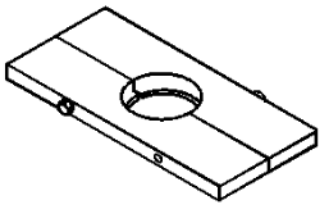
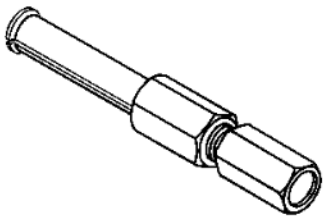
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	J 44419 Hub Bearing Race Installer (Outer)
	J 44420 Differential Bearing and Hub Seal Installer
	J 44685 Rear Axle Seal and Bearing Remover
	J 45177 Differential Seal Installer - Inner

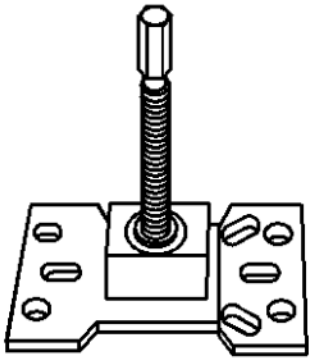
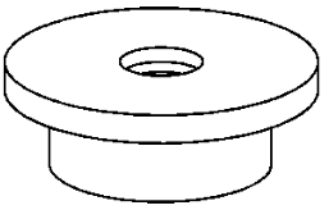
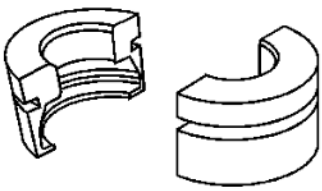
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	J 45692 Pinion Shim Selector Kit - Dana Axles
	J 45703 Pinion Bearing Race Remover - Dana 248
	J 45704 Pinion Bearing Race Installer - Dana 248
	J 45705 Pinion Bearing Race Remover - Dana 248/267

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	J 45710 Pinion Bearing Oil Seal Installer
	J 45711 Differential Side Bearing Remover - Dana 248
	J 45857 Tone Wheel and/or Bearing Remover
	J 45859 Axle Remover

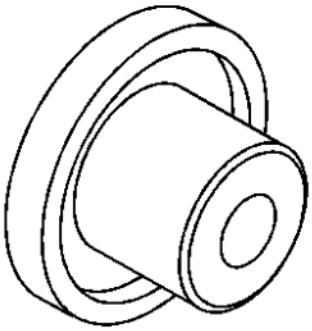
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	J 45870 Pinion Bearing Cup Installer
	J 45871 Pinion Bearing Remover
	J 45900 Differential Side Bearing Installer - Dana Axles

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2004 Cadillac Escalade

2004 DRIVELINE/AXLE Rear Drive Axle - C/K SUV



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