DRIVELINE/AXLE

Rear Drive Axle - Escalade, Suburban, Tahoe, Yukon

SPECIFICATIONS

FASTENER SPECIFICATIONS

Application	Specification	
	Metric	English
Axle Flange Bolt (10.5 Inch Axle)	231 N.m	170 lb ft
Bearing Cap Bolt (8.6 Inch Axle)	75 N.m	55 lb ft
Bearing Cap Bolt (9.5/9.5 Inch LD Axles)		
• First Pass	60 N.m	44 lb ft
• Final Pass	30 degrees	
Bearing Cap Bolt (10.5 Inch Axle)	185 N.m	136 lb ft
Brake Backing Plate Bolt	135 N.m	100 lb ft
Brake Hose Bracket Bolt	22 N.m	16 lb ft
Brake Pipe Bracket to Rear Axle Bolt	22 N.m	16 lb ft
Brake Pipe Bracket to Rear Axle Nut	13 N.m	115 lb in
Brake Pipe Junction Block Bolt	22 N.m	16 lb ft
Differential Bearing Adjuster Nut Lock Bolt (9.5/9.5 Inch LD Axles)	26 N.m	19 lb ft
Differential Bearing Adjuster Nut Lock Bolt (10.5 Inch Axle)	34 N.m	25 lb ft
Drain Plug (10.5 Inch Axle)	33 N.m	24 lb ft
Fill Plug (8.6/9.5 LD Inch Axles)	33 N.m	24 lb ft
Fill Plug (10.5 Inch Axle)	75 N.m	55 lb ft
Flex Hose Bracket Bolt	12 N.m	106 lb in
Pinion Gear Bearing Retainer Bolt (10.5 Inch Axle)	88 N.m	65 lb ft
Pinion Shaft Lock Bolt (8.6 Inch Axle)	36 N.m	27 lb ft
Pinion Shaft Lock Bolt (9.5/9.5 Inch LD Axles)	50 N.m	37 lb ft
Propeller Shaft Yoke Retainer Bolt	25 N.m	18 lb ft
Rear Axle Housing Cover Bolt (8.6/9.5/9.76 Inch Axles		
• First Pass	20 N.m	15 lb ft
• Final Pass	20 degrees	
Rear Axle Housing Cover Bolt (10.5/11.5 Inch Axles	40 N.m	30 lb ft
Ring Gear Bolt (8.6 Inch Axle)	120 N.m	89 lb ft
Ring Gear Bolt (9.5/9.5 Inch LD Axle)		
• First Pass	50 N.m	37 lb ft
• Final Pass	30 degrees	
Ring Gear Bolt (10.5 Inch Axle)	165 N.m	122 lb ft

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Application	Specification	
	Metric	English
Shock Absorber Nut - Lower	95 N.m	70 lb ft
Stabilizer Shaft Link Bolt	95 N.m	70 lb ft
Stabilizer Shaft U-bolt Nut	32 N.m	24 lb ft
U-bolt Nut	95 N.m	70 lb ft
U-bolt Nut (25 Series)	150 N.m	110 lb ft
Wheel Hub Nut (10.5 Inch Axles)	70 N.m	52 lb ft

APPROXIMATE FLUID CAPACITIES

See **Fluid and Lubricant Recommendations** for more information. All capacities are approximate. When adding, be sure to fill to the approximate level, as recommended in this manual. Recheck fluid level after filling.

Application	Specifications	
	Metric	US English
Axle Capacities		
• Rear Axle 1000 Series without RPO AXN (8.6")	2.03 liters	2.15 quarts
• Rear Axle 1000 Series (9.5" LD)	2.6 liters	2.75 quarts
• Rear Axle 1000 Series (9.76" LD)	2.6 liters	2.75 quarts
• Rear Axle 2000 Series (10.5" HD)	2.6 liters	2.75 quarts

AXLE PRELOAD AND BACKLASH SPECIFICATIONS

Application	Specification	
	Metric	English
Axle Shaft Flange Lateral Runout[1]	+/- 0.04 mm[1]	+/- 0.0016 in[1]
Axle Shaft Endplay/Lash (axial lash) per side, max	0.31 mm	0.012 in
Axle Shaft Radial Lash (up and down)	0.051 mm	0.002-0.003 in
Axle Shaft Wheel Pilot Diameter Tolerance Variation	77.81-77.76 mm	3.063-3.061 in
Backlash, NEW Gear Set	0.08-0.13 mm	0.003-0.005 in
Backlash, Gear Set, General Range	0.08-0.25 mm	0.003-0.010 in
Backlash, Used/Broken-In Gear Set, Preferred	0.13-0.18 mm	0.005-0.007 in
Pinion and Differential Case Bearing Preload, New Bearings	3.4-6.2 N.m	30-55 lb in
Pinion and Differential Case Bearing Preload, Used Bearings	2.8-5.1 N.m	25-45 lb in
Pinion Bearing Preload, New Bearings	1.7-3.4 N.m	15-30 lb in
Pinion Bearing Preload, Used Bearings	1.1-2.3 N.m	10-20 lb in
1. Measure axle shaft flange machined face while holding axle shaft inboard against differential cross pin.		

DIFFERENTIAL ADJUSTMENT SHIM SPECIFICATIONS

8.6 Inch Axle Differential Adjustment Shims Specifications

Number of Notches	Specification

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Inside	Outside	Metric	English
0	3	1.02 mm	0.040"
0	4	1.07 mm	0.042"
0	5	1.12 mm	0.044"
1	1	1.17 mm	0.046"
1	2	1.22 mm	0.048"
1	3	1.27 mm	0.050"
1	4	1.32 mm	0.052"
1	5	1.37 mm	0.054"
2	1	1.42 mm	0.056"
2	2	1.47 mm	0.058"
2	3	1.52 mm	0.060"
2	4	1.58 mm	0.062"
2	5	1.63 mm	0.064"
3	1	1.68 mm	0.066"
3	2	1.73 mm	0.068"
3	3	1.78 mm	0.070"
3	4	1.83 mm	0.072"
3	5	1.88 mm	0.074"
4	1	1.93 mm	0.076"
4	2	1.98 mm	0.078"
4	3	2.03 mm	0.080"
4	4	2.08 mm	0.082"
4	5	2.13 mm	0.084"
5	1	2.18 mm	0.086"
5	2	2.24 mm	0.088"
5	3	2.29 mm	0.090"
5	4	2.34 mm	0.092"
5	5	2.39 mm	0.094"
6	1	2.38 mm	0.096"
6	2	2.49 mm	0.098"
6	3	2.54 mm	0.100"

9.5/9.76 Inch Axle Differential Adjustment Shims Specifications

GM Part #	Specification	
	Metric	English
22835250	1.016 mm	.040"
22835249	1.067 mm	.042"
22835248	1.118 mm	.044"
22835247	1.168 mm	.046"
22835246	1.219 mm	.048"
22835245	1.27 mm	.050"
22835244	1.321 mm	.052"
22835243	1.372 mm	.054"
22835242	1.422 mm	.056"

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GM Part #	Specification	
	Metric	English
22835241	1.473 mm	.058"
22835240	1.524 mm	.060"
22835239	1.575 mm	.060"
22835238	1.626 mm	.064"
22835237	1.676 mm	.066"
22835236	1.727 mm	.068"
22835235	1.778 mm	.070"
22835234	1.829 mm	.072"
22835233	1.88 mm	.074"
22835232	1.93 mm	.076"

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	Canadian Part Number
Locking Differential Guides	Chassis Lubricant	12377985 or equivalent	88901242 or equivalent
Rear Locking Differential Clutch (friction disc) Disc	SAE 75W85 Synthetic Gear Oil	19300457 or equivalent meeting GM Specification 9986375	19300458 or equivalent
Rear Axle (8.6/9.5/9.76 inch axles)	SAE 75W85 Synthetic Gear Oil	19300457 or equivalent meeting GM Specification 9986375	19300458 or equivalent
Rear Axle (10.5, 11.5 inch axles)	SAE 75W90	88900401 or equivalent meeting GM Specification 9986115	89021678 or equivalent
Ring Gear	Marking Compound	1052351 or equivalent	10953497 or equivalent
Pinion Gear Bearing Retainer	Sealant	1052943 or equivalent	10953491 or equivalent
Pinion Yoke Splines	Sealant	12346004 or equivalent	10953480 or equivalent

LOCKING DIFFERENTIAL THRUST BLOCK SIZES

Color Code	8.6" Axle	9.5/9.76" Axle	10.5" Axle	11.5" Axle
Blue	34.290 mm (1.350")	40.49 mm (1.594")	40.488 mm (1.594")	46.055 mm (1.813")
Purple	33.578 mm (1.322")	40.59 mm (1.598")	40.589 mm (1.598")	46.155 mm (1.817")
White	33.680 mm (1.326")	40.69 mm (1.602")	40.691 mm (1.602")	46.255 mm (1.821")
Brown	33.782 mm (1.330")	40.79 mm (1.606")	40.792 mm (1.606")	46.355 mm (1.825")
Yellow	33.883 mm (1.334")	40.89 mm (1.610")	40.894 mm (1.610")	46.455 mm (1.829")
Orange	33.985 mm (1.338")	41.00 mm (1.614")	40.996 mm (1.614")	46.555 mm (1.833")
Pink	34.087 mm (1.342")	41.10 mm (1.618")	41.097 mm (1.618")	46.655 mm (1.837")
Green	34.188 mm (1.346")	41.20 mm (1.622")	41.199 mm (1.622")	46.755 mm (1.841")

COMPONENT LOCATOR

LOCKING DIFFERENTIAL DISASSEMBLED VIEWS

8.6 Inch Locking Differential

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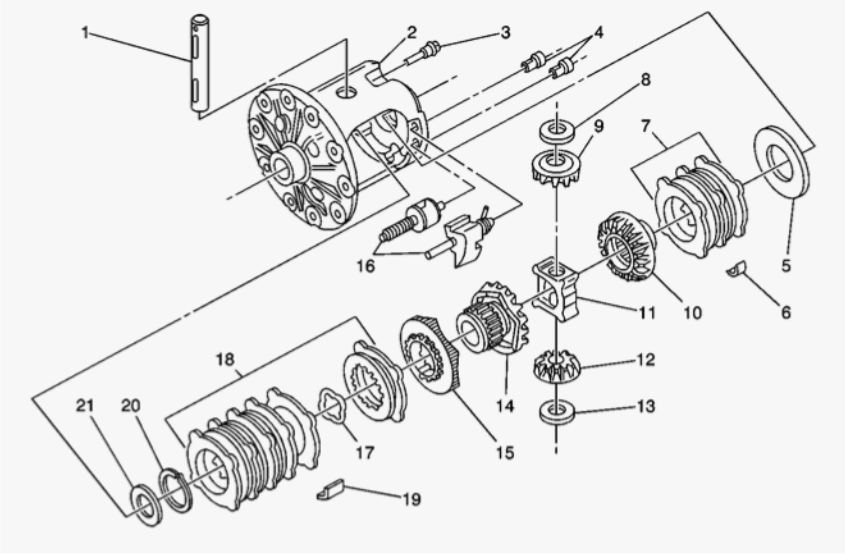


Fig. 1: 8.6 Locking Differential Disassembled View
Courtesy of GENERAL MOTORS COMPANY

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

9.5/9.76 Inch Locking Differential

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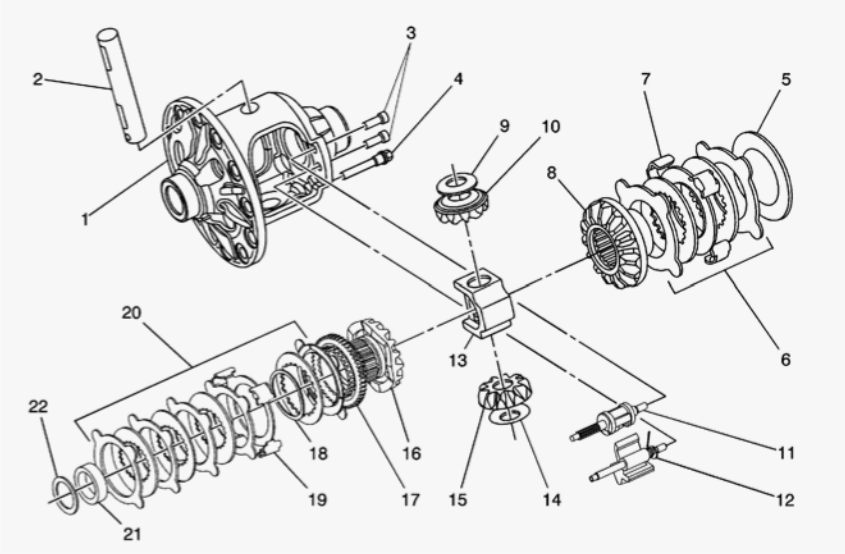


Fig. 2: 9.5/9.76 Locking Differential Disassembled View
Courtesy of GENERAL MOTORS COMPANY

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

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10.5 Locking Differential

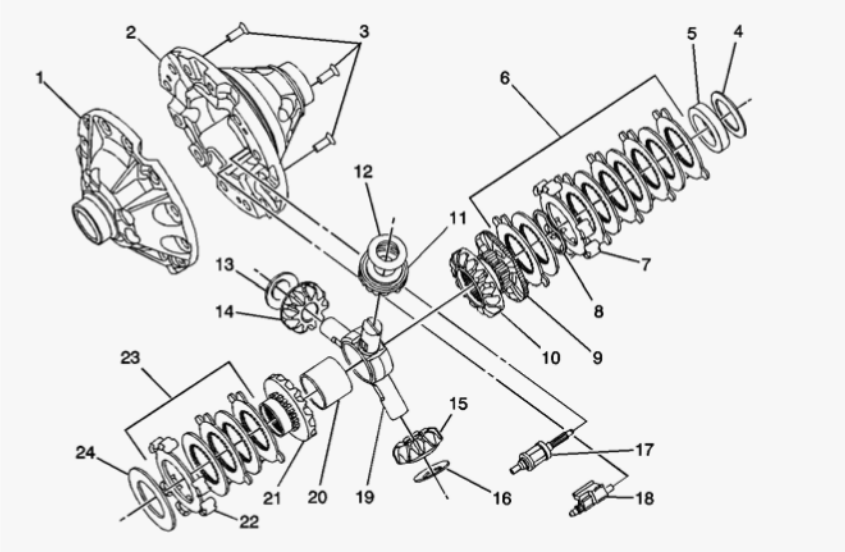


Fig. 3: 10.5 Locking Differential Disassembled View
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Differential Case - Left Side
2	Differential Case - Right Side
3	Differential Case Screws
4	Locking Differential Clutch Disc Thrust Washer
5	Locking Differential Side Gear Thrust Sleeve
6	Locking Differential Clutch Disc Set
7	Locking Differential Clutch Disc Guide
8	Wave Washer
9	Locking Differential Cam
10	Locking Differential Side Gear - Cam Faced
11	Differential Pinion Gear
12	Differential Pinion Gear Thrust Washer
13	Differential Pinion Gear Thrust Washer
14	Differential Pinion Gear
15	Differential Pinion Gear
16	Differential Pinion Gear Thrust Washer
17	Locking Differential Governor
18	Locking Differential Latching Bracket and Spring
19	Locking Differential Spider
20	Locking Differential Thrust Block
21	Locking Differential Side Gear

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Callout	Component Name
22	Locking Differential Clutch Disc Guide
23	Locking Differential Clutch Disc Set
24	Differential Side Gear Shim

REAR AXLE DISASSEMBLED VIEWS

9.5/9.76 Inch Rear Axle

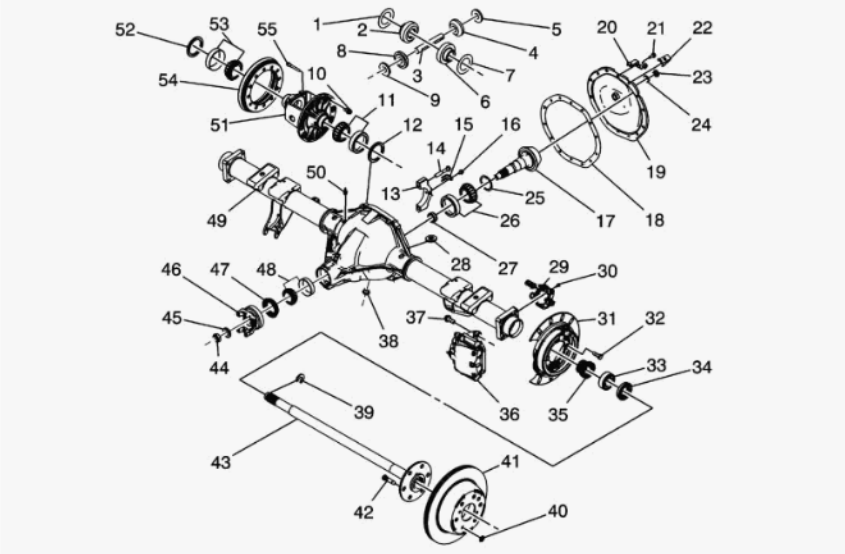


Fig. 4: 9.5/9.76 Rear Axle Disassembled View
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Axle Housing Assembly
2	Vent Hose Connector
3	Ring Gear Bolt
4	Differential Case
5	Differential Case Bearing Shim
6	Differential Case Bearing Assembly
7	Ring Gear
8	Differential Cross Shaft Lock Screw
9	Differential Side Gear Thrust Washer
10	Differential Side Gear
11	Differential Cross Shaft
12	Differential Pinion Gear
13	Differential Pinion Gear Thrust Washer
14	Differential Side Gear Thrust Washer
15	Differential Side Gear

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Callout	Component Name
16	Differential Pinion Gear
17	Differential Pinion Gear Thrust Washer
18	Differential Case Bearing Assembly
19	Differential Case Bearing Shim
20	Differential Bearing Cap
21	Differential Bearing Cap Bolt
22	Pinion Bearing Spacer
23	Brake Line Bracket
24	Rear Axle Housing Cover Bolt
25	Fill Plug
26	Fill Plug Washer
27	Rear Axle Housing Cover
28	Rear Axle Housing Cover Gasket
29	Drive Pinion
30	Pinion Bearing Shim
31	Pinion Inner Bearing Assembly
32	Park Brake Assembly
33	Park Brake Attachment Bolt
34	VSES Exciter Ring Assembly
35	Axle Shaft Bearing Assembly
36	Axle Shaft Seal Assembly
37	VSES Sensor Assembly
38	VSES Sensor Bolt
39	Brake Rotor
40	Wheel Stud
41	Axle Shaft
42	Axle Shaft C-Lock
43	Caliper Assembly
44	Caliper Bolt
45	Pinion Flange Nut
46	Pinion Flange Assembly
47	Flange Seal Assembly
48	Pinion Outer Bearing Assembly

8.6 Inch Rear Axle

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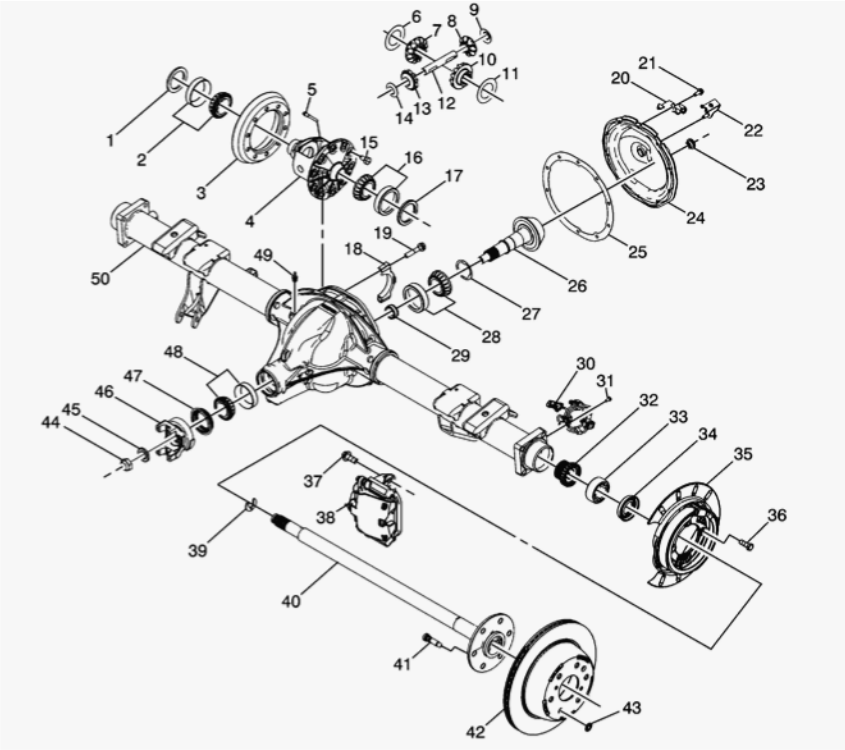


Fig. 5: 8.6 Rear Axle Disassembled View
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Differential Case Bearing Shim
2	Differential Case Bearing Assembly
3	Ring Gear
4	Differential Case
5	Differential Cross Pin Lock Screw
6	Differential Side Gear Thrust Washer
7	Differential Side Gear
8	Differential Pinion Gear
9	Differential Pinion Thrust Washer
10	Differential Side Gear
11	Differential Side Gear Thrust Washer
12	Differential Cross Pin
13	Differential Pinion Gear
14	Differential Pinion Gear Thrust Washer
15	Ring Gear Bolt
16	Differential Case Bearing Assembly
17	Differential Case Bearing Shim

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Callout	Component Name
18	Carrier Bearing Cap
19	Carrier Bearing Cap Bolt
20	Cover Pan Clip
21	Cover Pan Bolt
22	Cover Pan Bracket Assembly
23	Fill Plug Assembly
24	Cover Pan
25	Cover Pan Gasket
26	Drive Pinion
27	Drive Pinion Bearing Shim
28	Drive Pinion Head Bearing Assembly
29	Drive Pinion Bearing Spacer
30	VSES Sensor Assembly
31	VSES Sensor Bolt
32	VSES Exciter Ring Assembly
33	Axle Shaft Bearing Assembly
34	Axle Shaft Seal Assembly
35	Park Brake Assembly
36	Park Brake Attachment Bolt
37	Caliper Bolt
38	Caliper Assembly
39	Axle Shaft C-Lock
40	Axle Shaft
41	Wheel Stud
42	Brake Rotor
43	Push Nut
44	Pinion Flange Nut
45	Pinion Flange Washer
46	Pinion Flange Assembly
47	Pinion Flange Seal Assembly
48	Drive Pinion Tail Bearing Assembly
49	Vent Connector
50	Axle Housing Assembly

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - LOCKING/LIMITED SLIP REAR AXLE

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

Visual/Physical Inspection

- Inspect the system for the following:
  - Loose or missing fasteners
  - Obvious damage or conditions which may cause the symptom.

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- Check the system for proper operation. Refer to **Locking Differential Diagnosis**.

Symptom List

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

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

SYMPTOMS - REAR DRIVE AXLE

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

Rear Axle Noise

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

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

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

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

Visual/Physical Inspection

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

Symptom List

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

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

REAR DRIVE AXLE NOISES

Gear Noise

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

- Drive - Acceleration or heavy pull
- Road Load - Vehicle driving load or constant speed

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- Float - Using enough throttle to keep the vehicle from driving the engine, the vehicle slows down gradually but the engine still pulls slightly
- Coast - Throttle is closed and the vehicle is in gear

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

Bearing Noise

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

Rear Wheel Bearing Noise

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

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

Knock at Low Speeds

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

Backlash Clunk

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

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

Inspect, adjust or replace the affected components as necessary.

NOISY IN DRIVE

Cause	Correction
DEFINITION: A noise heard during acceleration load.	
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to **Backlash Adjustment (9.5/9.76 Inch Axle)Backlash Adjustment (8.6 Inch Axle)Backlash Adjustment (10.5 Inch Axle)**.
Worn pinion and ring gear	Replace the pinion and the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Worn pinion bearings	Replace the pinion bearings. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle)**.
Loose pinion bearings	Adjust the pinion bearings preload. Refer to **Pinion Depth Adjustment (8.6 Inch Axle)Pinion Depth Adjustment (10.5 Inch Axle)Pinion Depth Adjustment (9.5 Inch Axle)Pinion Depth Adjustment (9.76 Inch Axle)**.
Excessive pinion end play	Adjust the pinion end play. Refer to **Pinion Depth Adjustment (8.6 Inch Axle)Pinion Depth Adjustment (10.5 Inch Axle)Pinion Depth Adjustment (9.5 Inch Axle)Pinion Depth Adjustment (9.76 Inch Axle)**.
Worn differential bearings	Replace the differential bearings. Refer to **Differential Bearing Replacement**.

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Cause	Correction
Loose differential bearings	Adjust the differential bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (9.5/9.76 Inch Axle)Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)Differential Carrier Bearing Preload Adjustment (10.5 Inch Axle)**.
Excessive ring gear runout	Replace the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to **Rear Axle Lubricant Level Inspection (8.6, 9.5/9.76 Inch Axle)Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to **Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)Differential Oil Replacement (10.5 Inch Axle)**.
Bent axle housing	Replace the axle housing. Refer to **Rear Axle Replacement (10.5 Inch Axle)Rear Axle Replacement (8.6/9.5/9.76 Inch Axles)**.

NOISY WHEN COASTING

Checks	Action
DEFINITION: Noise is audible when slowing down and disappears when driving.	
Worn pinion and ring gear	Adjust or replace the pinion and the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Pinion and ring gear too tight	Adjust the pinion and the ring gear backlash. Refer to **Backlash Adjustment (9.5/9.76 Inch Axle)Backlash Adjustment (8.6 Inch Axle)Backlash Adjustment (10.5 Inch Axle)**.

INTERMITTENT NOISE

Checks	Action
Warped ring gear	Replace the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Loose differential case bolts	Tighten differential case bolts to specifications. Refer to **Fastener Specifications**.

CONSTANT NOISE

Cause	Correction
DEFINITION: A noise heard in the rear axle during all driving conditions. This noise may increase or decrease in volume based on different driving maneuvers and speeds.	
Flat spot on the pinion or the ring gear teeth	Replace the pinion and the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Flat spot on the pinion bearing	Replace the bearing. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle)**.
Worn pinion splines	Replace the pinion. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Low oil level	Fill the fluid level to specifications with the proper lubricant. Refer to **Rear Axle Lubricant Level Inspection (8.6, 9.5/9.76 Inch Axle)Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
Wrong or poor grade oil	Drain and refill the system with the proper lubricant. Refer to **Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)Differential Oil Replacement (10.5 Inch Axle)**.
Excessive pinion to ring gear backlash	Adjust the pinion to ring gear backlash. Refer to **Backlash Adjustment (9.5/9.76 Inch Axle)Backlash Adjustment (8.6 Inch Axle)Backlash Adjustment (10.5 Inch Axle)**.
Loose pinion bearings	Adjust the pinion bearings preload. Refer to **Pinion Depth Adjustment (8.6 Inch Axle)Pinion Depth Adjustment (10.5 Inch Axle)Pinion Depth Adjustment (9.5 Inch Axle)Pinion Depth Adjustment (9.76 Inch Axle)**.
Excessive pinion end play	Adjust the pinion end play. Refer to **Pinion Depth Adjustment (8.6 Inch Axle)Pinion Depth Adjustment (10.5 Inch Axle)Pinion Depth Adjustment (9.5 Inch Axle)Pinion Depth Adjustment (9.76 Inch Axle)**.

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Cause	Correction
Incorrect differential bearing preload	Adjust the differential bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (9.5/9.76 Inch Axle)Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)Differential Carrier Bearing Preload Adjustment (10.5 Inch Axle)**.
Incorrect backlash	Adjust the pinion and ring gear backlash. Refer to **Backlash Adjustment (9.5/9.76 Inch Axle)Backlash Adjustment (8.6 Inch Axle)Backlash Adjustment (10.5 Inch Axle)**.
Worn pinion bearings	Replace the pinion bearings. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle)**.
Worn differential bearings	Replace the differential bearings. Refer to **Differential Bearing Replacement**.
Worn pinion and ring gear	Replace the pinion and ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Excessive ring gear runout	Replace the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
Bent axle housing	Replace the axle housing. Refer to **Rear Axle Replacement (10.5 Inch Axle)Rear Axle Replacement (8.6/9.5/9.76 Inch Axles)**.
Worn axle shaft dowel holes	Replace the axle shaft. Refer to **Rear Axle Shaft Replacement**.
Worn hub studs	Replace the wheel studs. Refer to **Wheel Stud Replacement (1500) Wheel Stud Replacement (Heavy Duty)** .
Bent axle shaft	Replace the axle shaft. Refer to **Rear Axle Shaft Replacement**.

NOISY ON TURNS

Checks	Action
Worn differential side gears and pinions	Replace the differential side gears and pinions. Refer to **Differential Overhaul (8.6/9.5/9.76 Inch Axles)Differential Overhaul (10.5 Inch Axle)**.
Worn differential spider gears	Replace the spider gears. Refer to **Differential Overhaul (8.6/9.5/9.76 Inch Axles)Differential Overhaul (10.5 Inch Axle)**.
Worn axle shaft splines	Replace the axle shaft. Refer to **Rear Axle Shaft Replacement**.

WHEEL BEARING WEAR - REAR DRIVE AXLE (STRAIGHT)

Straight Roller Bearing Diagnosis

Consider the following factors when diagnosing a bearing condition:

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

Wear (Minor)

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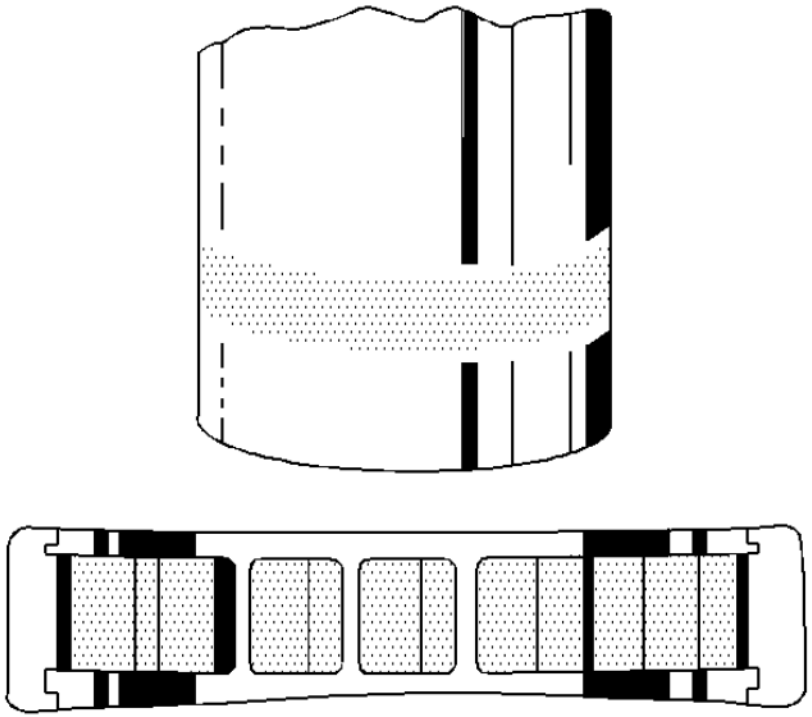


Fig. 6: Identifying Minor Wear
Courtesy of GENERAL MOTORS COMPANY

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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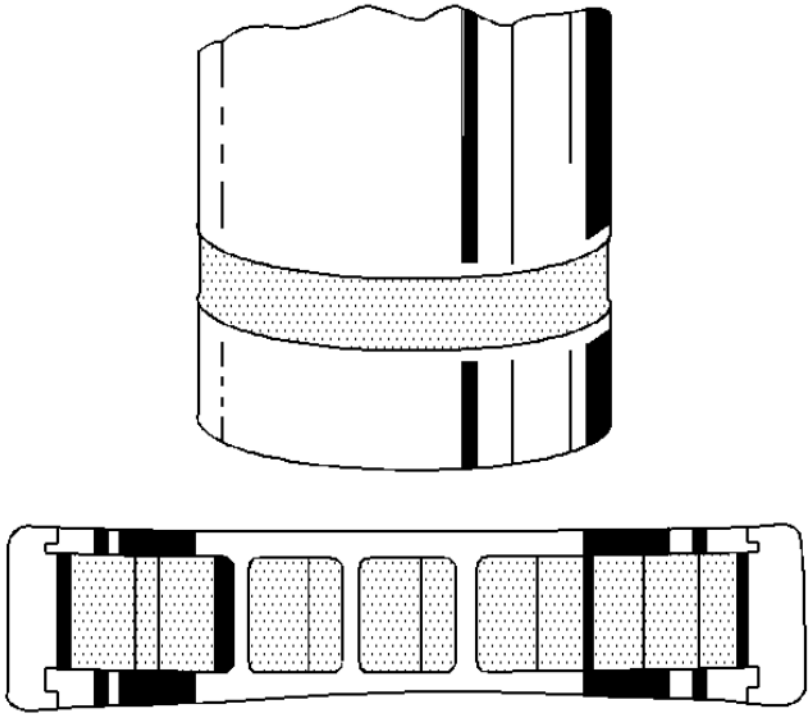


Fig. 7: Identifying Major Wear
Courtesy of GENERAL MOTORS COMPANY

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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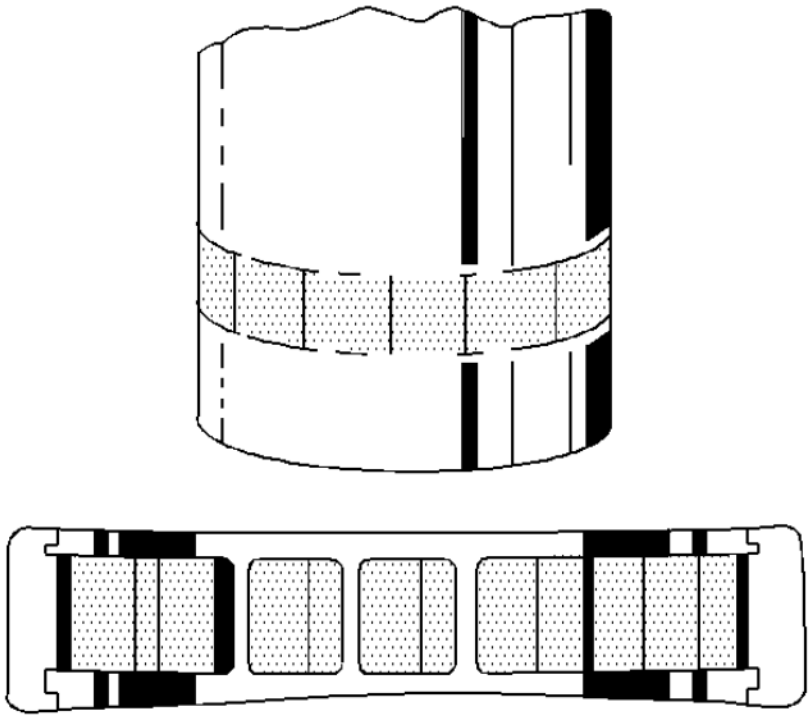


Fig. 8: Identifying Brinelling
Courtesy of GENERAL MOTORS COMPANY

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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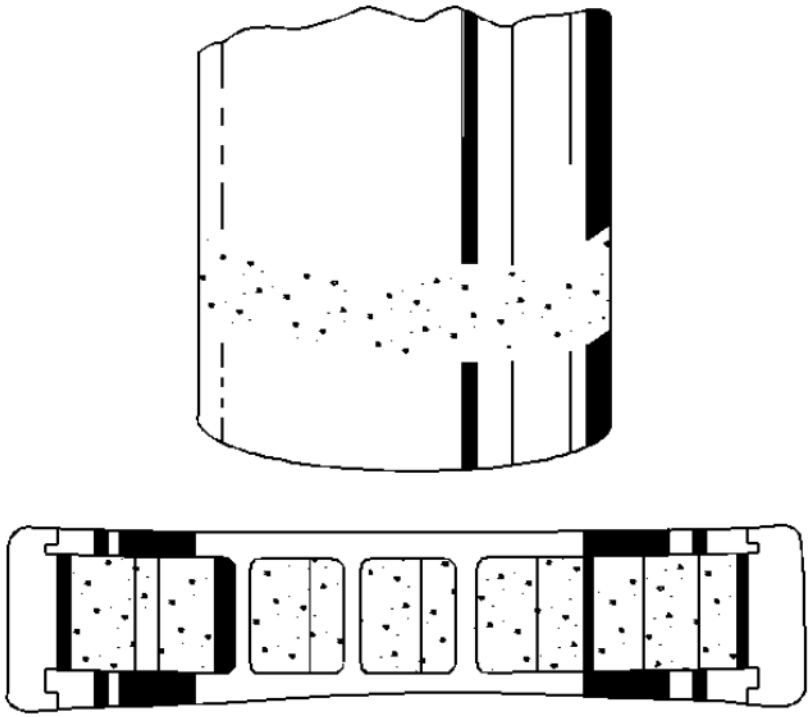


Fig. 9: Identifying Indentations
Courtesy of GENERAL MOTORS COMPANY

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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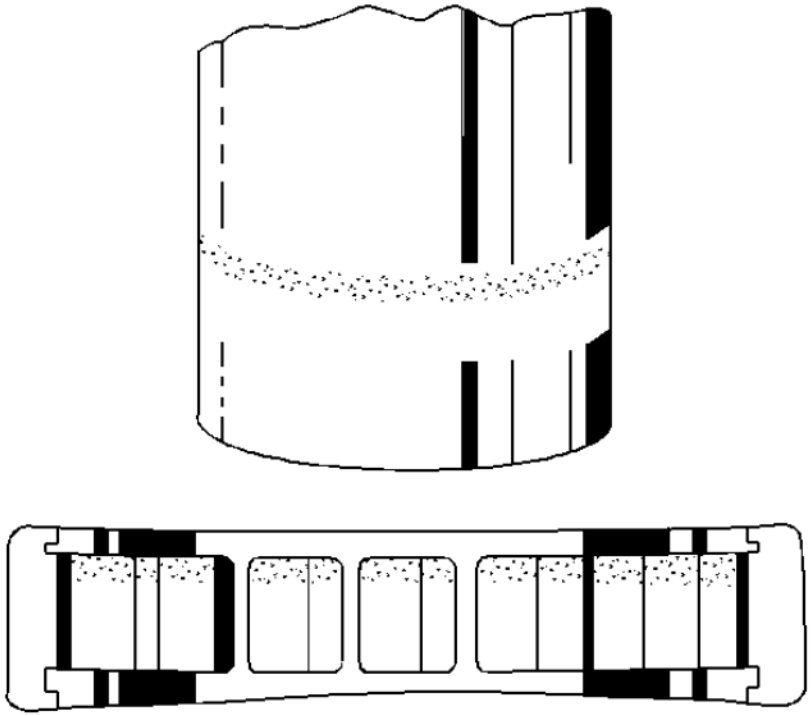


Fig. 10: Identifying Single Edge Pitting
Courtesy of GENERAL MOTORS COMPANY

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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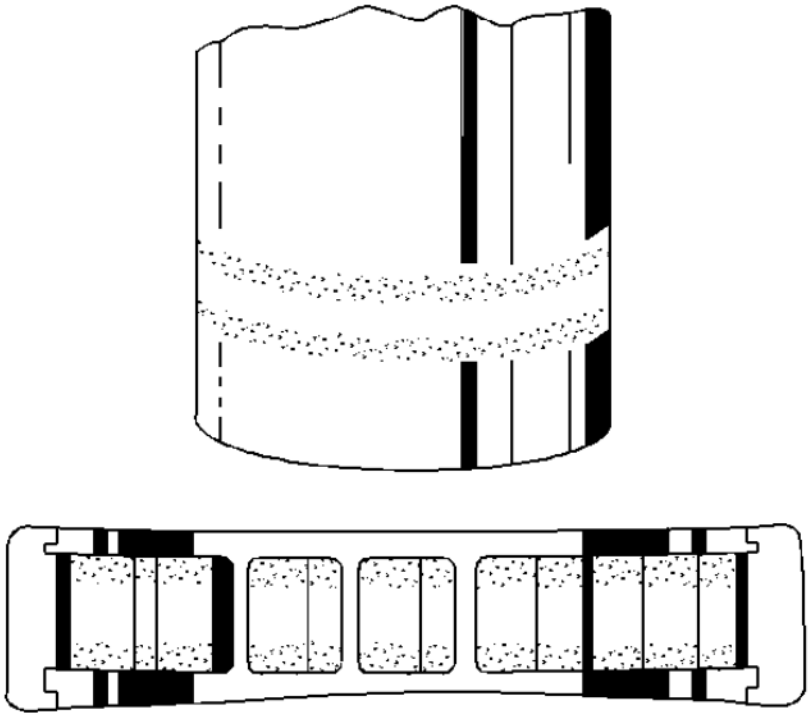


Fig. 11: Identifying Double Edge Pitting
Courtesy of GENERAL MOTORS COMPANY

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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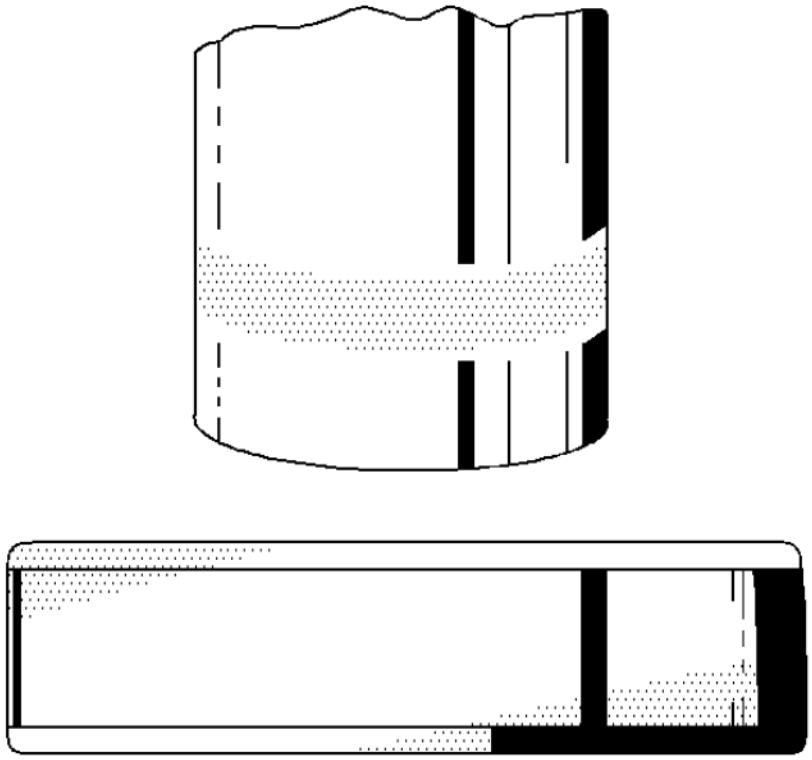


Fig. 12: Identifying Misalignment
Courtesy of GENERAL MOTORS COMPANY

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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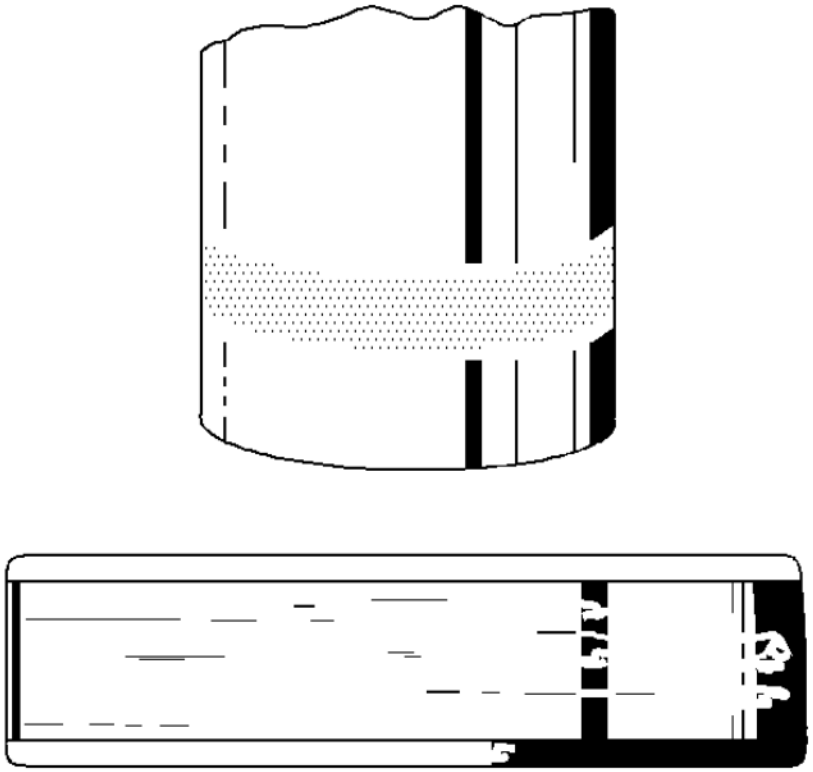


Fig. 13: Identifying Frettage
Courtesy of GENERAL MOTORS COMPANY

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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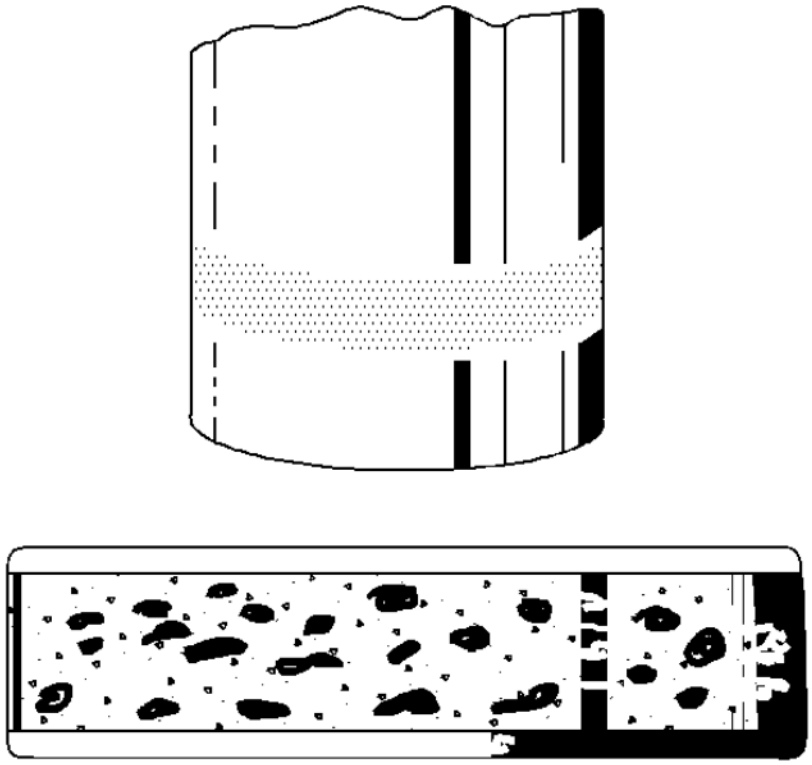


Fig. 14: Identifying Smears
Courtesy of GENERAL MOTORS COMPANY

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

WHEEL BEARING WEAR - REAR DRIVE AXLE (TAPERED)

Tapered Roller Bearing Diagnosis

Consider the following factors when diagnosing bearing condition:

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

Abrasive Roller Wear

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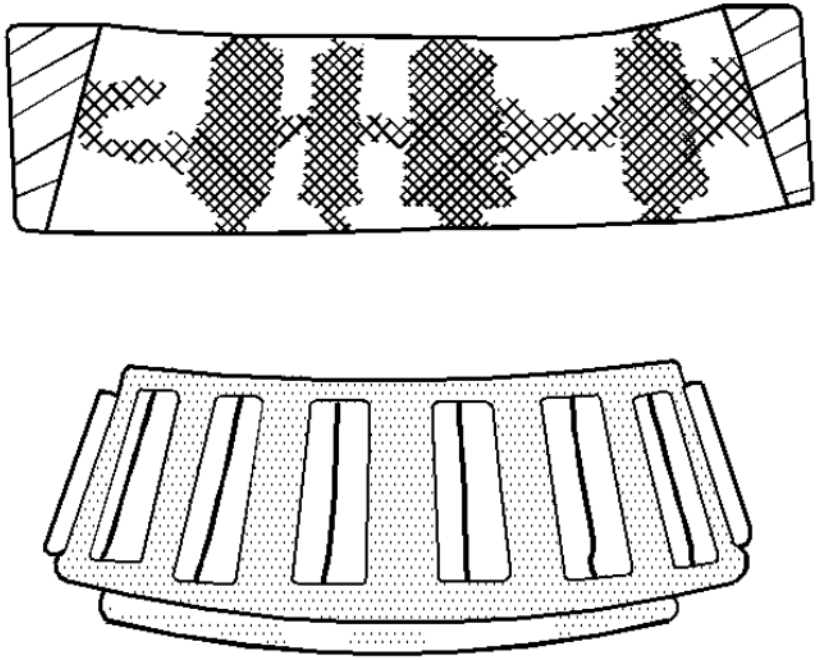


Fig. 15: Identifying Abrasive Roller Wear
Courtesy of GENERAL MOTORS COMPANY

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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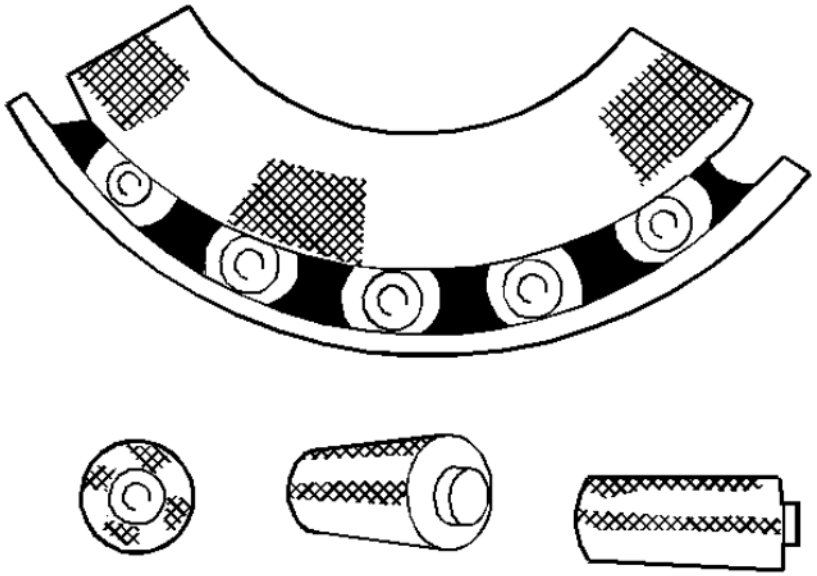


Fig. 16: Identifying Abrasive Step Wear
Courtesy of GENERAL MOTORS COMPANY

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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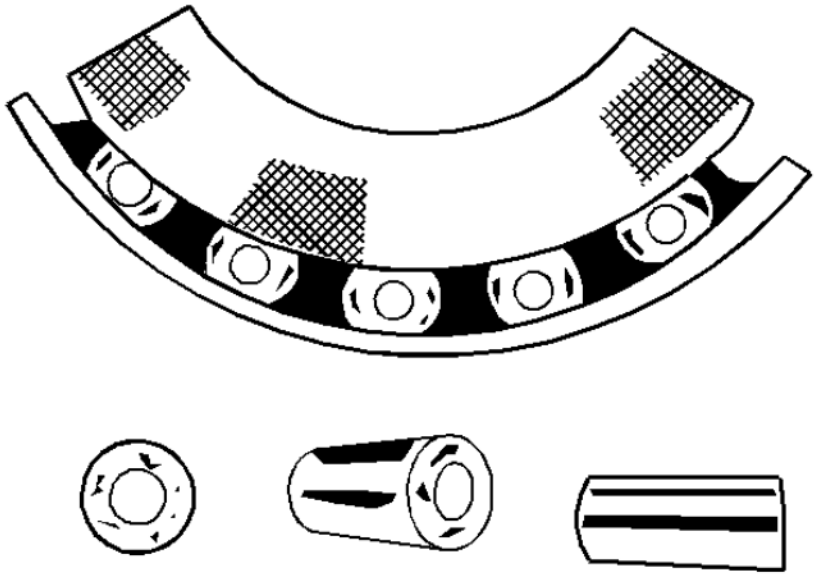


Fig. 17: Identifying Galling
Courtesy of GENERAL MOTORS COMPANY

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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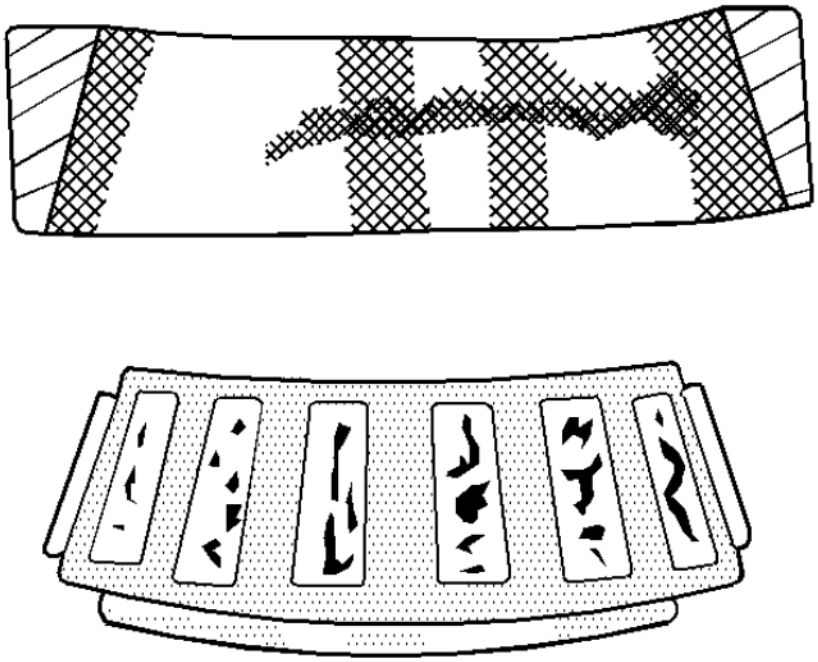


Fig. 18: Identifying Etching
Courtesy of GENERAL MOTORS COMPANY

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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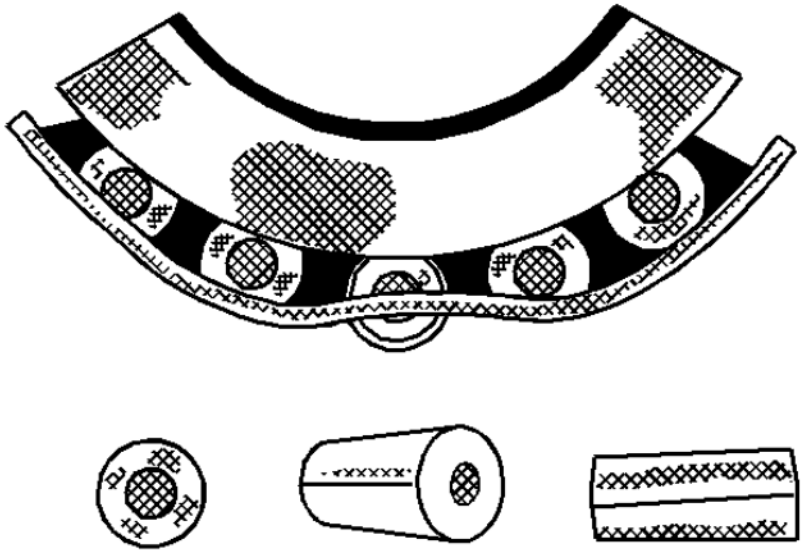


Fig. 19: Identifying Bent Cage
Courtesy of GENERAL MOTORS COMPANY

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

Cage Wear

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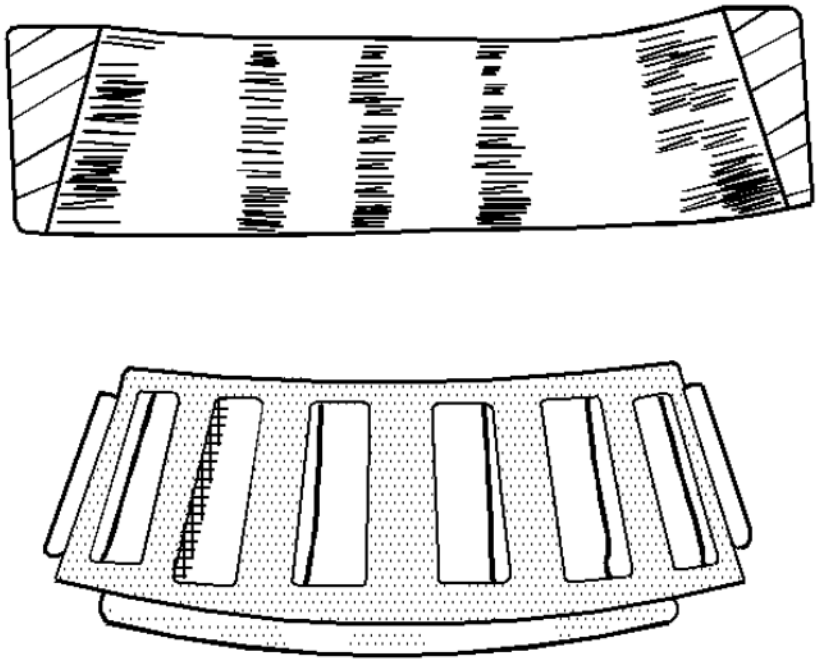


Fig. 20: Identifying Cage Wear
Courtesy of GENERAL MOTORS COMPANY

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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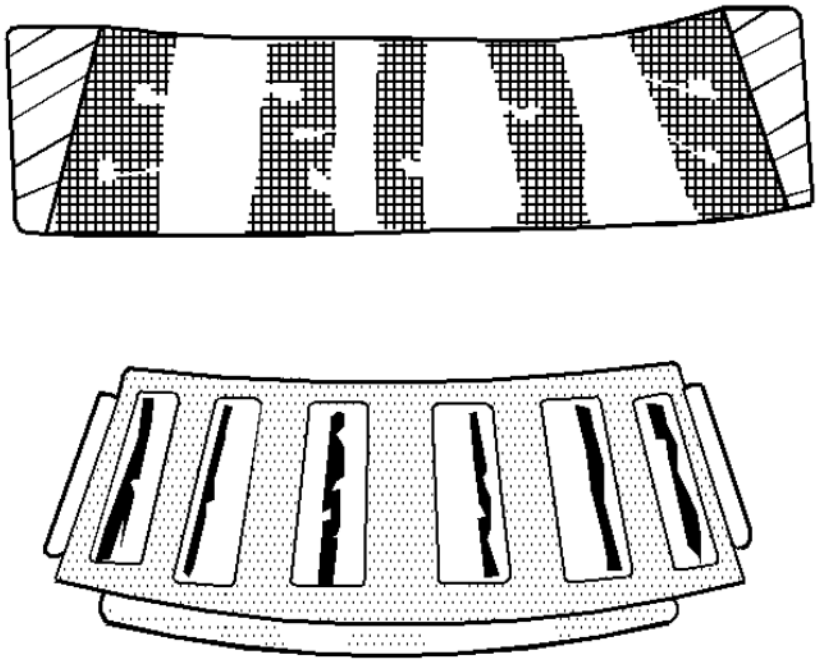


Fig. 21: Identifying Indentations
Courtesy of GENERAL MOTORS COMPANY

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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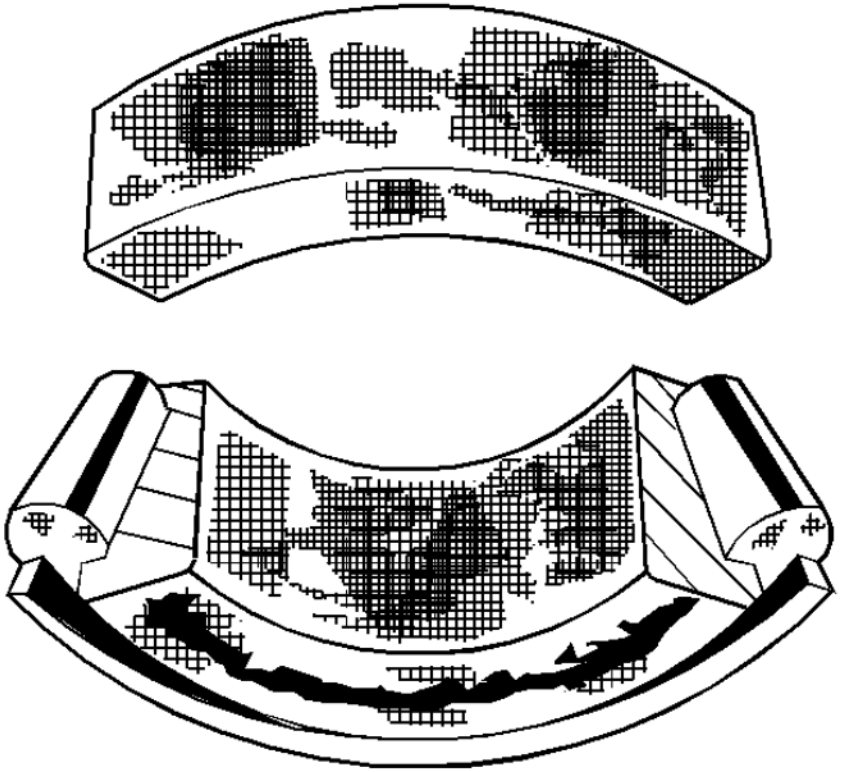


Fig. 22: Identifying Frettage
Courtesy of GENERAL MOTORS COMPANY

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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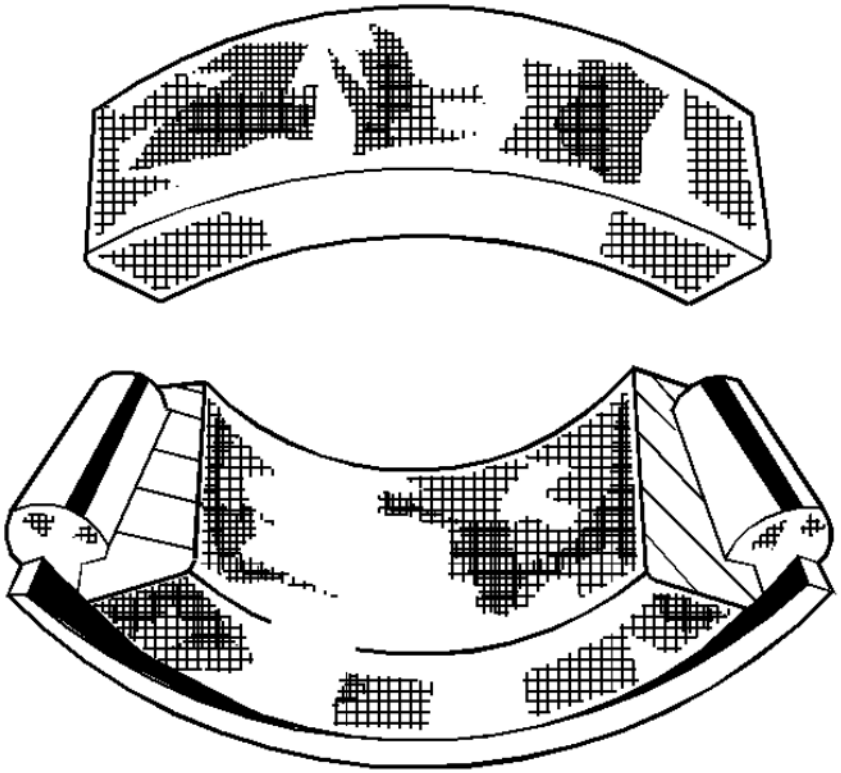


Fig. 23: Identifying Smears
Courtesy of GENERAL MOTORS COMPANY

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

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

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

Stain Discoloration

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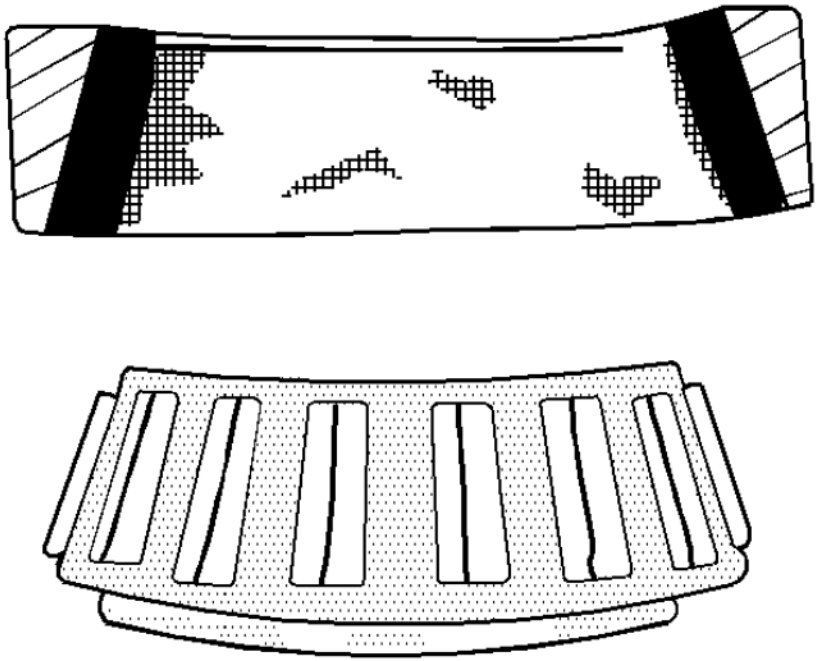


Fig. 24: Identifying Stain Discoloration
Courtesy of GENERAL MOTORS COMPANY

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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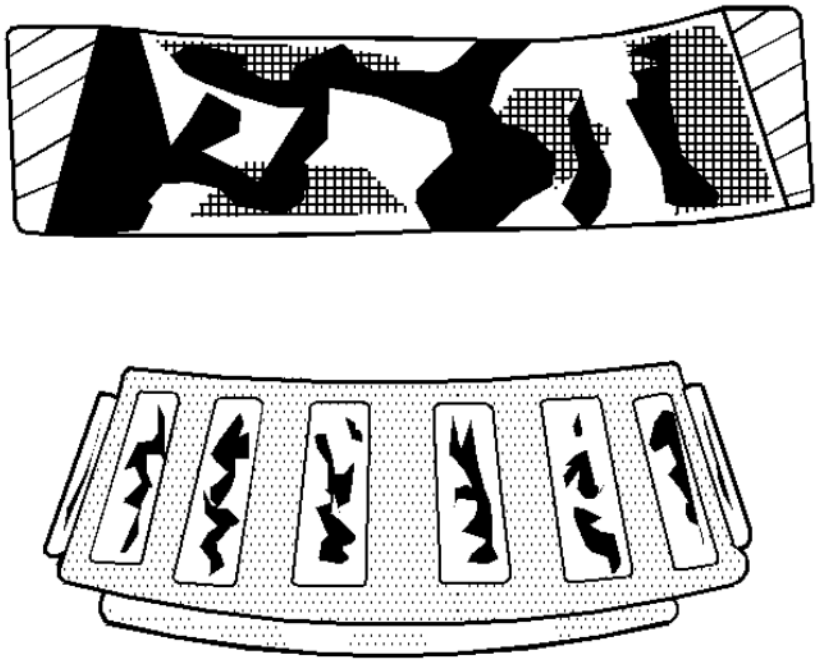


Fig. 25: Identifying Heat Discoloration
Courtesy of GENERAL MOTORS COMPANY

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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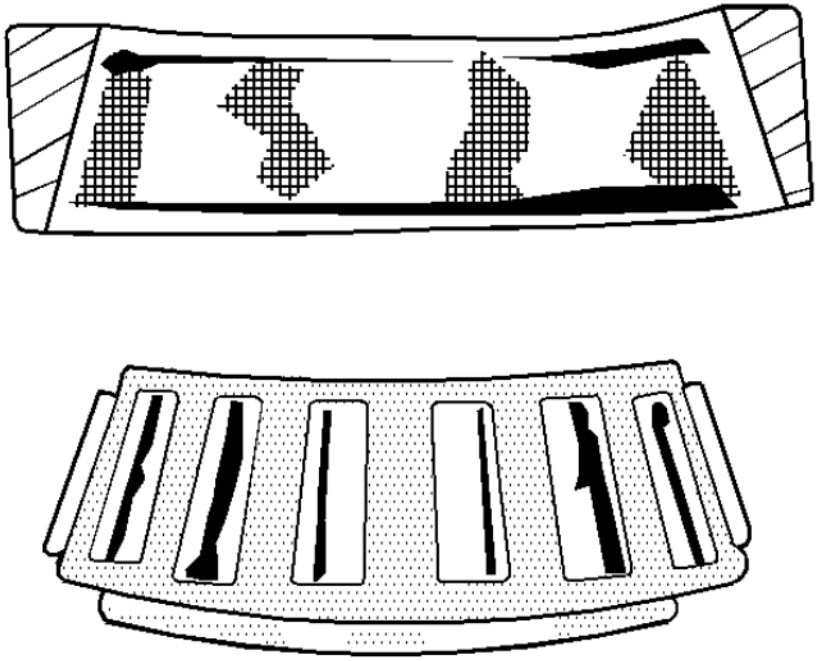


Fig. 26: Identifying Misalignment
Courtesy of GENERAL MOTORS COMPANY

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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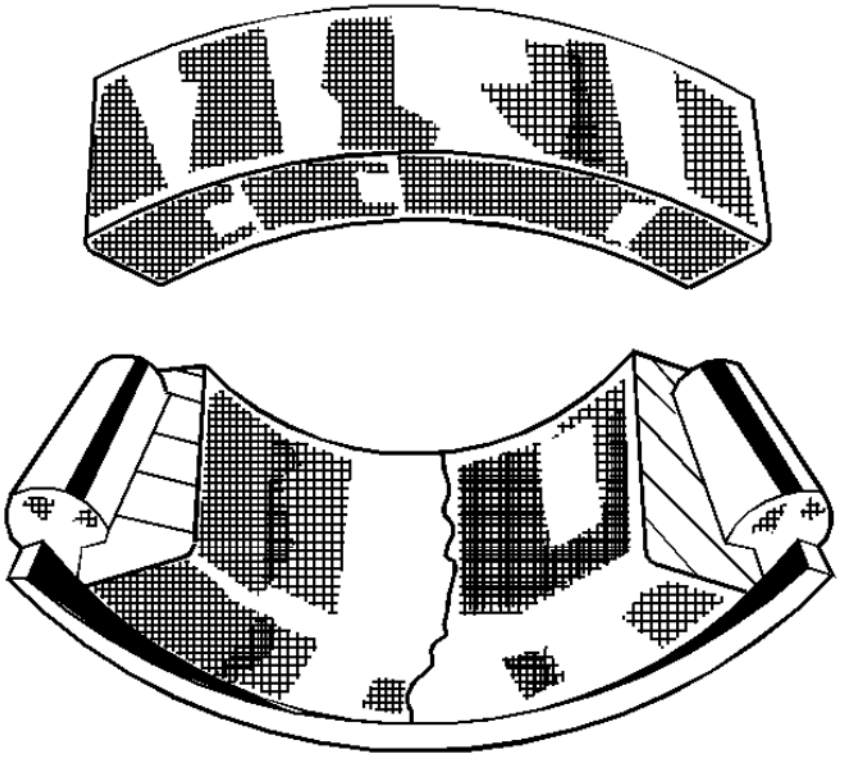


Fig. 27: Identifying Cracked Inner Race
Courtesy of GENERAL MOTORS COMPANY

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

Fatigue Spalling

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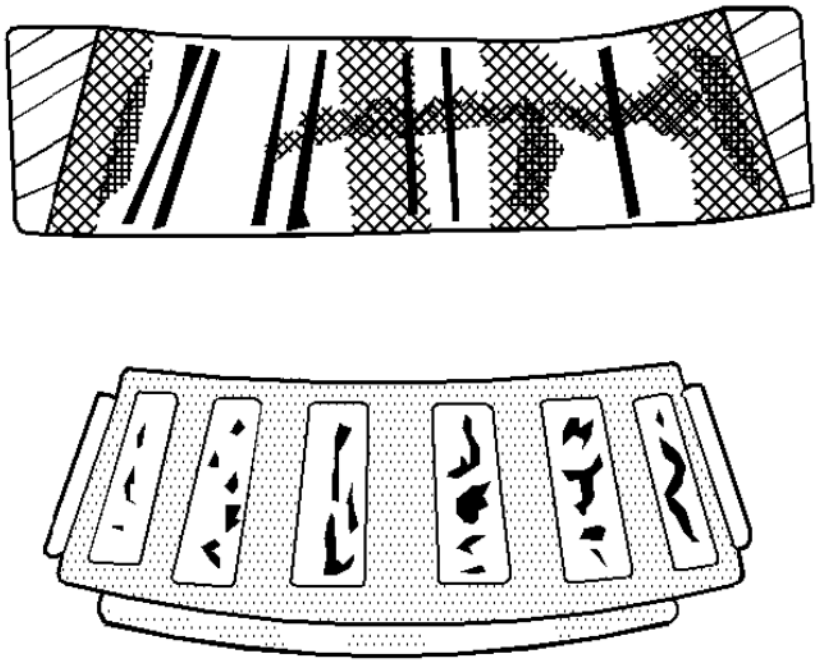


Fig. 28: Identifying Fatigue Spalling
Courtesy of GENERAL MOTORS COMPANY

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

Brinelling

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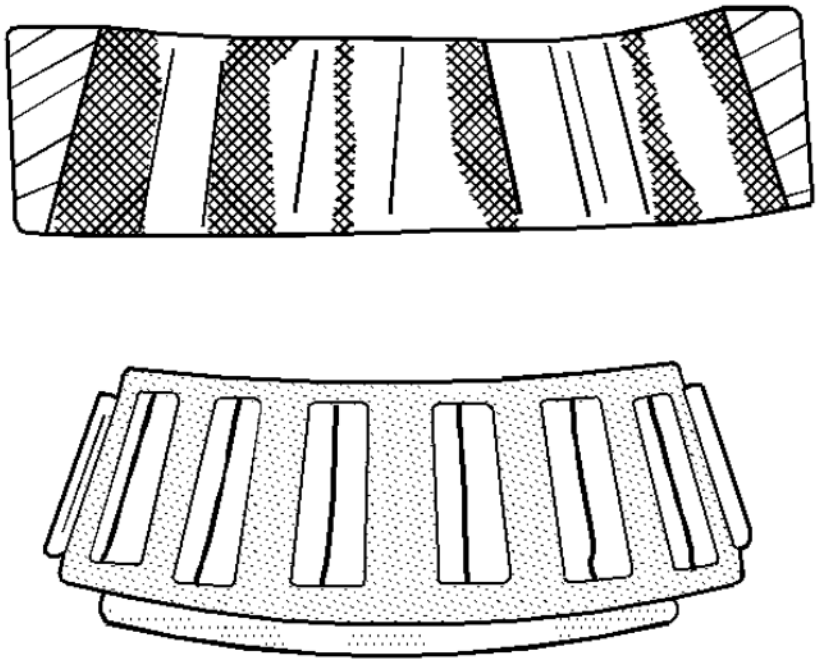


Fig. 29: Identifying Brinelling
Courtesy of GENERAL MOTORS COMPANY

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

REAR AXLE LUBRICANT LEAK DIAGNOSIS

Rear axle lubricant leaks can occur at the following locations:

- Axle tube to differential carrier housing joint
- Axle shaft oil seal
- Axle housing porosity
- Differential housing cover gasket
- Drain plug
- Fill plug
- Pinion yoke oil seal
- Vent tube

Determining the Cause

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

Oil Seals

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

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

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

Gaskets

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

Rear Axle Housing

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

- Drain Plug
- Fill Plug

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

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

LIMITED SLIP DIFFERENTIAL DIAGNOSIS

Limited Slip Differential Diagnosis

Step	Action	Values	Yes	No
1	Did you review the general description and perform the necessary inspections?	-	Go to **Step 2**	Go to **Locking Differential Description and Operation**
2	Measure the rotational force of the axle using the following procedure: 1. Block the front wheels. 2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 3. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** . 4. Using the **J 42129** Wheel Hub Remover, measure the rotational force of the axle. 5. Repeat the procedure for the other axle. Does the force measure outside the specified range?	22-271 N.m (30-200 lb ft)	Go to **Step 3**	System OK

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Step	Action	Values	Yes	No
3	Repair the rear axle. Did you complete the repair?	-	Go to **Step 4**	-
4	Operate the system in order to verify the repair. Did you correct the condition?	-	Go to **Step 2**	System OK

LOCKING DIFFERENTIAL DIAGNOSIS

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

LOCKING REAR AXLE DOES NOT LOCK

Checks	Action
Little or no preload on the latching bracket	Replace the governor assembly and the latching bracket. Refer to **Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle)**, and **Locking Differential Cam Unit Disassemble (8.6 Inch Axle)Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Disassemble (10.5 Inch Axle)**.
Flyweights in the governor assembly are stuck closed	Replace the governor assembly and the latching bracket. Refer to **Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle)**.
The drive teeth on the governor or cam gear assembly are broken	Replace the cam plate, the governor assembly, and the latching bracket. Refer to the following: • **Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle)** • **Locking Differential Cam Unit Disassemble (8.6 Inch Axle)Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Disassemble (10.5 Inch Axle)** • **Locking Differential Cleaning and Inspection** • **Locking Differential Cam Unit Assemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Assemble (8.6 Inch Axle)Locking Differential Cam Unit Assemble (10.5 Inch Axle)** • **Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axle)** • **Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle)**
Broken clutch plates	Replace the clutch plates and the wave spring. Refer to the following: • **Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle)** • **Locking Differential Cam Unit Disassemble (8.6 Inch Axle)Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Disassemble (10.5 Inch Axle)** • **Locking Differential Cleaning and Inspection** • **Locking Differential Cam Unit Assemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Assemble (8.6 Inch**

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Checks	Action
	Axle)Locking Differential Cam Unit Assemble (10.5 Inch Axle) • Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axle) • Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle)

LOCKING REAR AXLE LOCKS IN TURNS

Checks	Action
The governor assembly is tight in the case	Free up the governor assembly. Refer to Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle), and Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle).
Broken or weak governor flyweight spring	Replace the governor assembly and the latching bracket. Refer to Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle), and Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle).
The flyweight in the governor assembly is stuck open	Replace the governor assembly and the latching bracket. Refer to Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle), and Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle).
The cam plate or the governor drive teeth are broken	Replace the cam plate, the governor assembly, and the latching bracket. Refer to the following: • Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle) • Locking Differential Cam Unit Disassemble (8.6 Inch Axle)Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Disassemble (10.5 Inch Axle) • Locking Differential Cleaning and Inspection • Locking Differential Cam Unit Assemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Assemble (8.6 Inch Axle)Locking Differential Cam Unit Assemble (10.5 Inch Axle) • Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axle) • Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle)

LOCKING REAR DRIVE AXLE CHATTERS IN TURNS

Checks	Action
Lubricant is contaminated	Drain and flush the axle housing thoroughly. Refill with the correct lubricant. Refer to Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)Differential Oil Replacement (10.5 Inch Axle).
The clutch plates are deteriorated	Replace the clutch plates. Refer to Locking Differential Cam Unit Disassemble (8.6 Inch Axle)Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Disassemble (10.5 Inch Axle), and Symptoms - Locking/Limited Slip Rear Axle.

NOISE IN ADDITION TO NORMAL CLUTCH ENGAGEMENT

Checks	Action
The clutch plates are broken	Replace the clutch plates. Refer to the following: • Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle) • Locking Differential Cam Unit Disassemble (8.6 Inch Axle)Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Disassemble (10.5 Inch Axle) • Locking Differential Cleaning and Inspection • Locking Differential Cam Unit Assemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Assemble (8.6 Inch

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Checks	Action
	Axle)Locking Differential Cam Unit Assemble (10.5 Inch Axle) • Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axle) • Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle)
The thrust block is broken	Replace the thrust block with a block of identical thickness. Check closely for other damage. Refer to Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle), and Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle).
The case is damaged	Replace the unit. Refer to Differential Replacement (8.6/9.5/9.76 Inch Axles)Differential Replacement (10.5 Inch Axle).
The differential gears are broken	Replace the gears. Refer to the following: • Locking Differential Disassemble (8.6/9.5/9.76 Inch Axles)Locking Differential Disassemble (10.5 Inch Axle) • Locking Differential Cam Unit Disassemble (8.6 Inch Axle)Locking Differential Cam Unit Disassemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Disassemble (10.5 Inch Axle) • Locking Differential Cleaning and Inspection • Locking Differential Cam Unit Assemble (9.5/9.76 Inch Axle)Locking Differential Cam Unit Assemble (8.6 Inch Axle)Locking Differential Cam Unit Assemble (10.5 Inch Axle) • Locking Differential Adjustment (8.6/9.5/9.76 Inch Axles)Locking Differential Adjustment (10.5 Inch Axle) • Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)Locking Differential Assemble (10.5 Inch Axle)

REPAIR INSTRUCTIONS

REAR AXLE LUBRICANT LEVEL INSPECTION (8.6/9.5/9.76 INCH AXLE)

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

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

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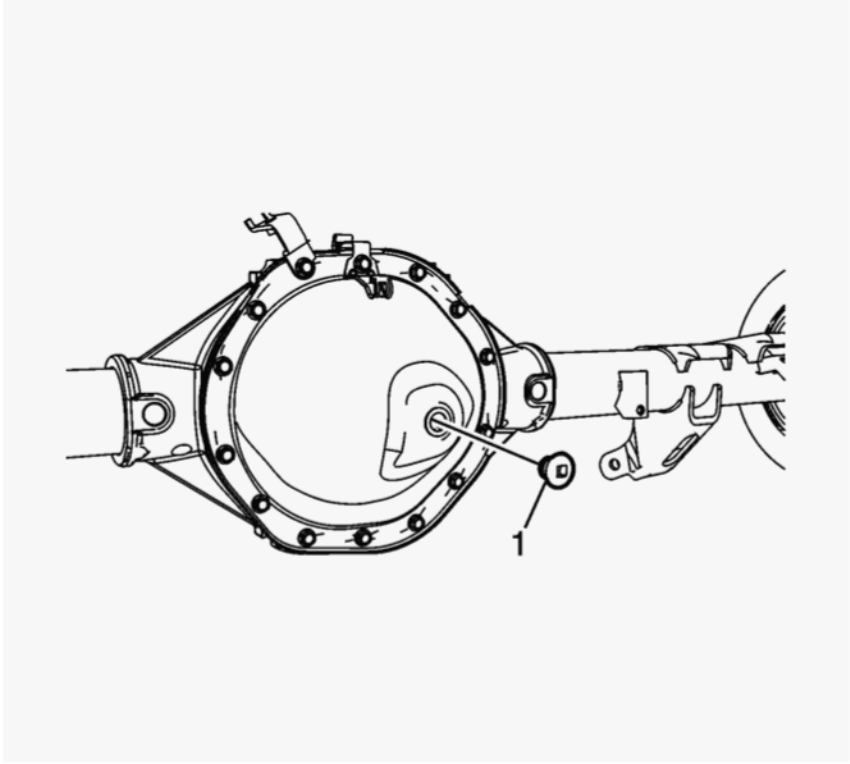


Fig. 30: Rear Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

5. Remove the rear axle fill plug (1).
6. Inspect the lubricant level:
   - **Specification**

     The lubricant level should be between 1-19 mm (0.04-0.75 in) below the fill plug opening for the 8.6 inch axle.

   - **Specification**

     The lubricant level should be between 15-40 mm (0.59-1.57 in) below the fill plug opening for the 9.5/9.76 inch LD axle.

     NOTE: **The axle lube, refer to Adhesives, Fluids, Lubricants, and Sealers, that is used may appear dark in color and may leave a dark film on the internal components. This darkened color does not affect the durability of the lube nor will it adversely affect the oil from providing the necessary lubrication it was designed to do. This darkened oil does not need to be replaced unless there is a strong burnt oil smell to the lube. If the oil has a strong burnt oil smell, then all components would need to be visually inspected and any parts that are damaged would then need to be replaced along with the oil.**

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** .

   CAUTION: **Refer to Fastener Caution .**

8. Install the rear axle fill plug and tighten to 33 N.m (24 lb ft).

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9. Lower the vehicle.

REAR AXLE LUBRICANT LEVEL INSPECTION (10.5 INCH AXLE)

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

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

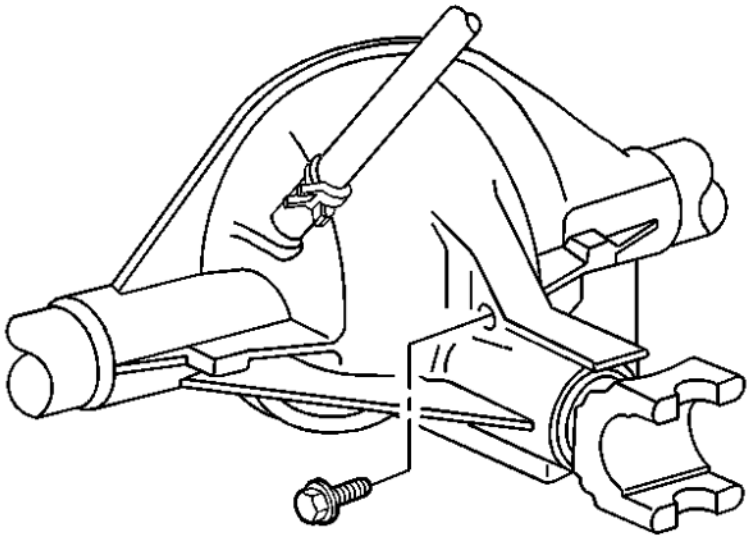


Fig. 31: Rear Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

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

Specification

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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** .

CAUTION: **Refer to Fastener Caution .**

8. Install the rear axle fill plug.

Tighten

Tighten the rear axle fill plug to 75 N.m (55 lb ft).

9. Lower the vehicle.

DIFFERENTIAL OIL REPLACEMENT (8.6 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Clean the area around the rear axle fill plug.
3. Remove the rear axle fill plug.
4. Remove the rear axle cover. Refer to **Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)**.

NOTE: **The axle lube, refer to Adhesives, Fluids, Lubricants, and Sealers, that is used may appear dark in color and may leave a dark film on the internal components. This darkened color does not affect the durability of the lube nor will it adversely affect the oil from providing the necessary lubrication it was designed to do. This darkened oil does not need to be replaced unless there is a strong burnt oil smell to the lube. If the oil has a strong burnt oil smell, then all components would need to be visually inspected and any parts that are damaged would then need to be replaced along with the oil.**

5. Drain the lubricant into a suitable container.

Installation Procedure

1. Install the rear axle cover. Refer to **Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)**.
2. Fill the rear axle with axle lubricant. Use the proper fluid. Refer to **Approximate Fluid Capacities**, and **Adhesives, Fluids, Lubricants, and Sealers**.

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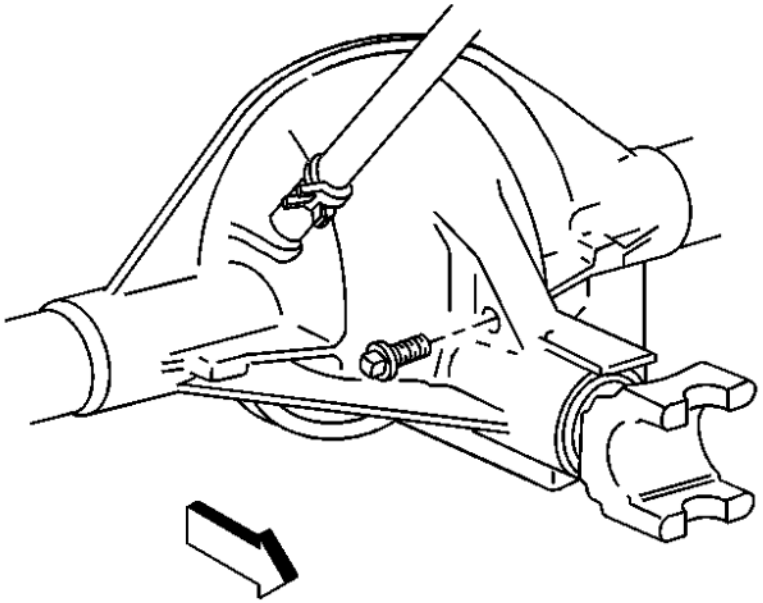


Fig. 32: Rear Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the rear axle fill plug and tighten to 33 N.m (24 lb ft).
4. Lower the vehicle.

DIFFERENTIAL OIL REPLACEMENT (9.5/9.76 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Clean the area around the rear axle fill plug.

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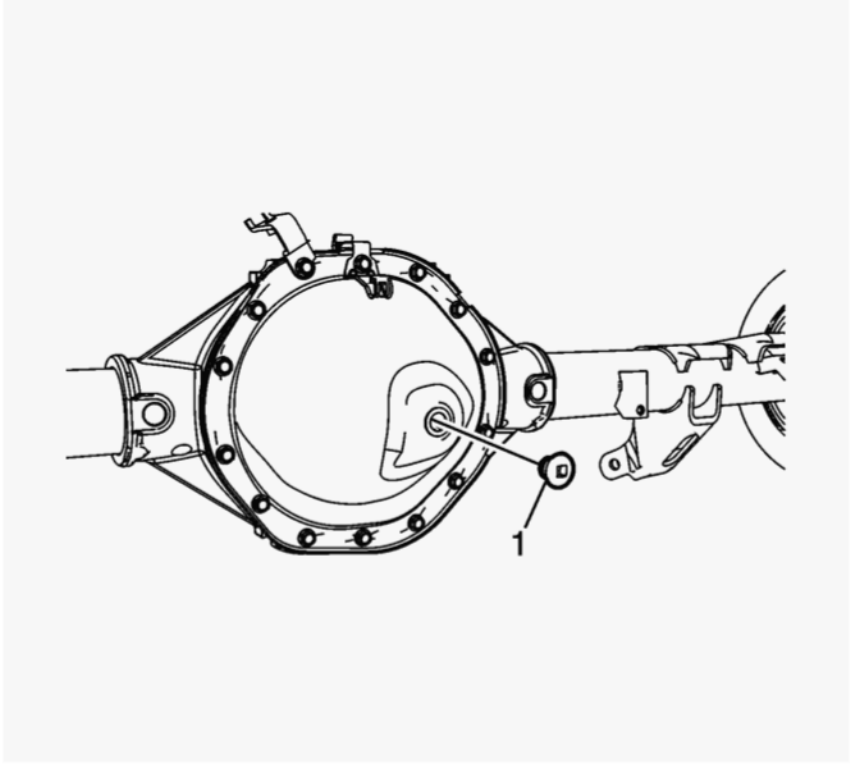


Fig. 33: Rear Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

3. Remove the fill plug (1).
4. Remove the rear axle cover. Refer to **Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)**.

NOTE: **The axle lube that is used may appear dark in color and may leave a dark film on the internal components. This darkened color does not affect the durability of the lube nor will it adversely affect the oil from providing the necessary lubrication it was designed to do. This darkened oil does not need to be replaced unless there is a strong burnt oil smell to the lube. If the oil has a strong burnt oil smell, then all components would need to be visually inspected and any parts that are damaged would then need to be replaced along with the oil.**

5. Drain the lubricant into a suitable container.

Installation Procedure

1. Install the rear axle cover. Refer to **Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)**.
2. Fill the rear drive axle with lubricant. Use the proper fluid, refer to **Approximate Fluid Capacities**, and **Adhesives, Fluids, Lubricants, and Sealers**.

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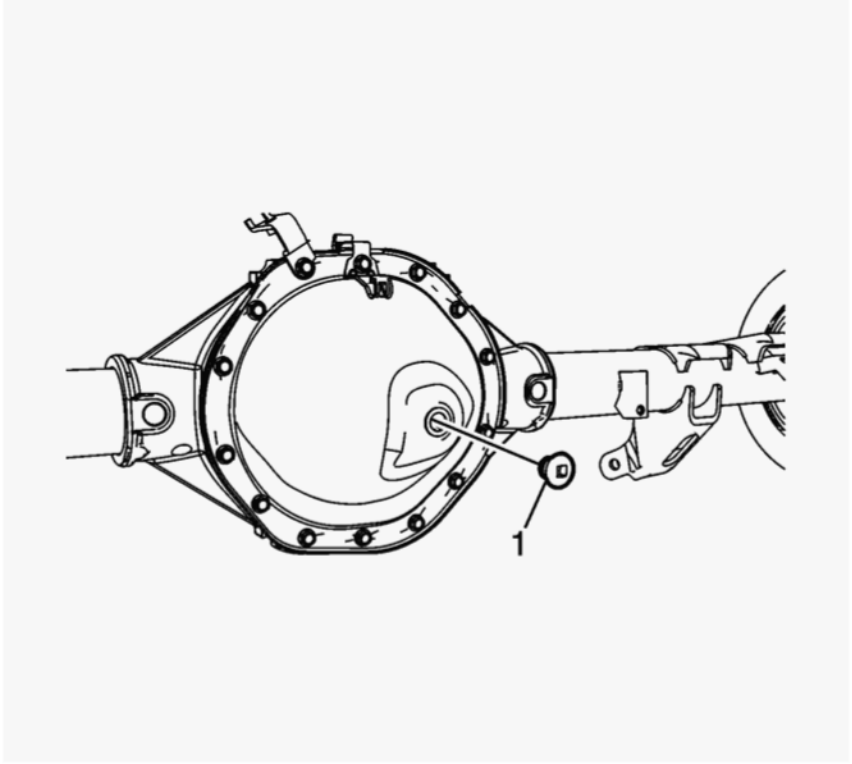


Fig. 34: Rear Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the fill plug (1) and tighten to 33 N.m (24 lb ft).
4. Remove the support and lower the vehicle.

DIFFERENTIAL OIL REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

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

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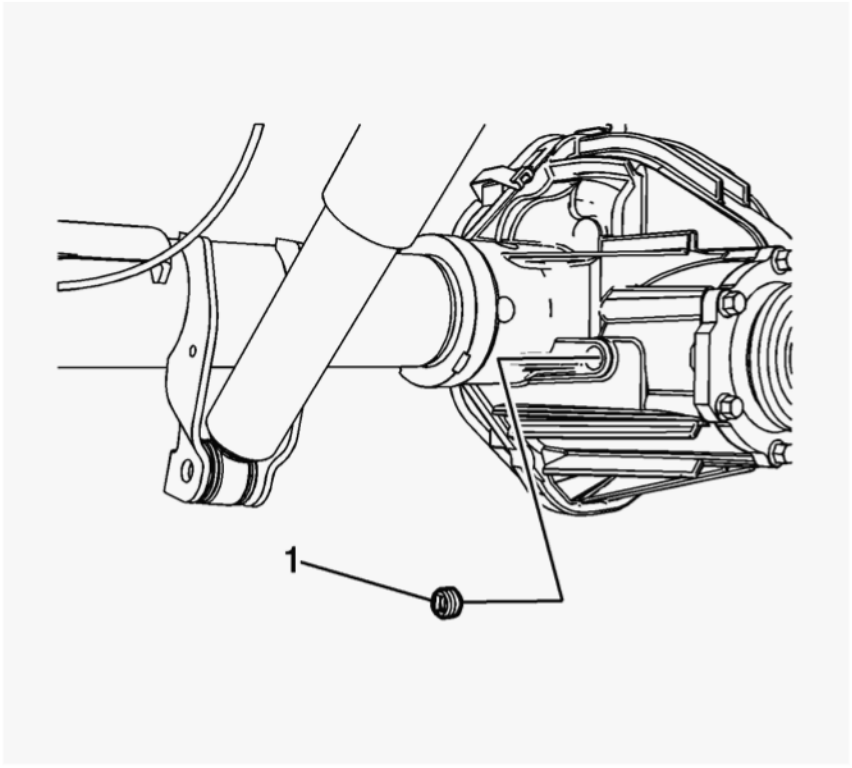


Fig. 35: Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

2. Remove the fill plug (1).

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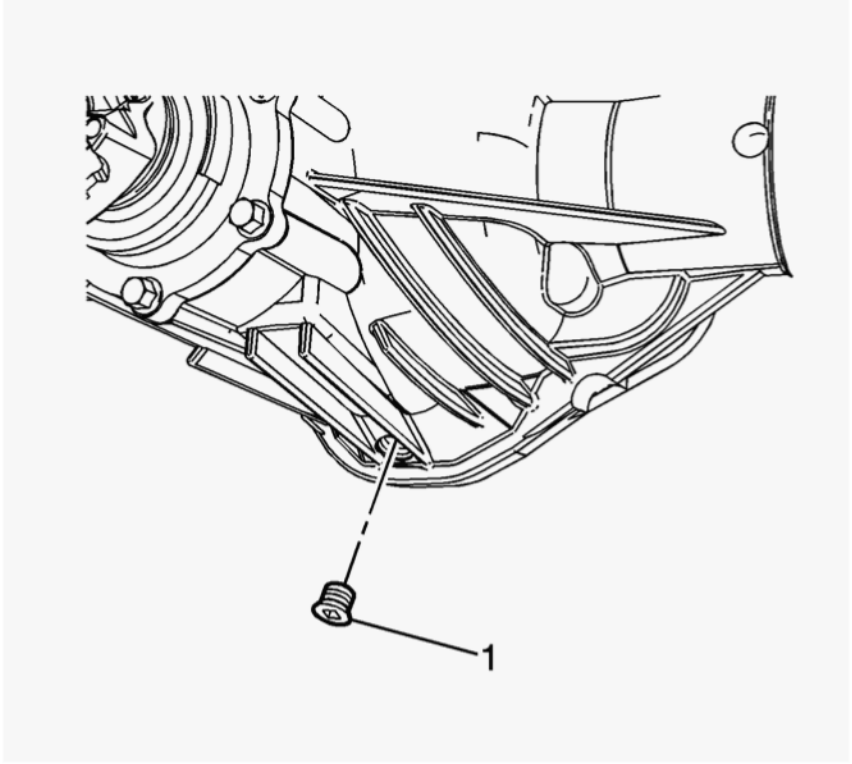


Fig. 36: Axle Drain Plug
Courtesy of GENERAL MOTORS COMPANY

3. Remove the rear axle drain plug (1).
4. Drain the lubricant into a suitable container.

Installation Procedure

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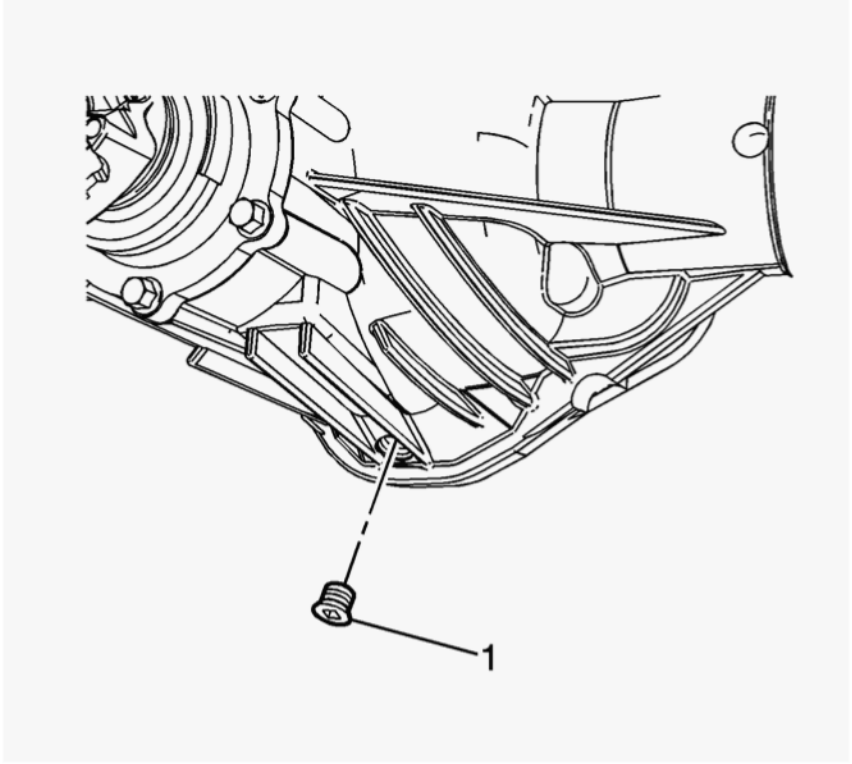


Fig. 37: Axle Drain Plug
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the rear axle drain plug (1) and tighten to 33 N.m (24 lb ft).
2. Fill the rear axle with the proper fluid. Refer to Approximate Fluid Capacities, and Fluid and Lubricant Recommendations .

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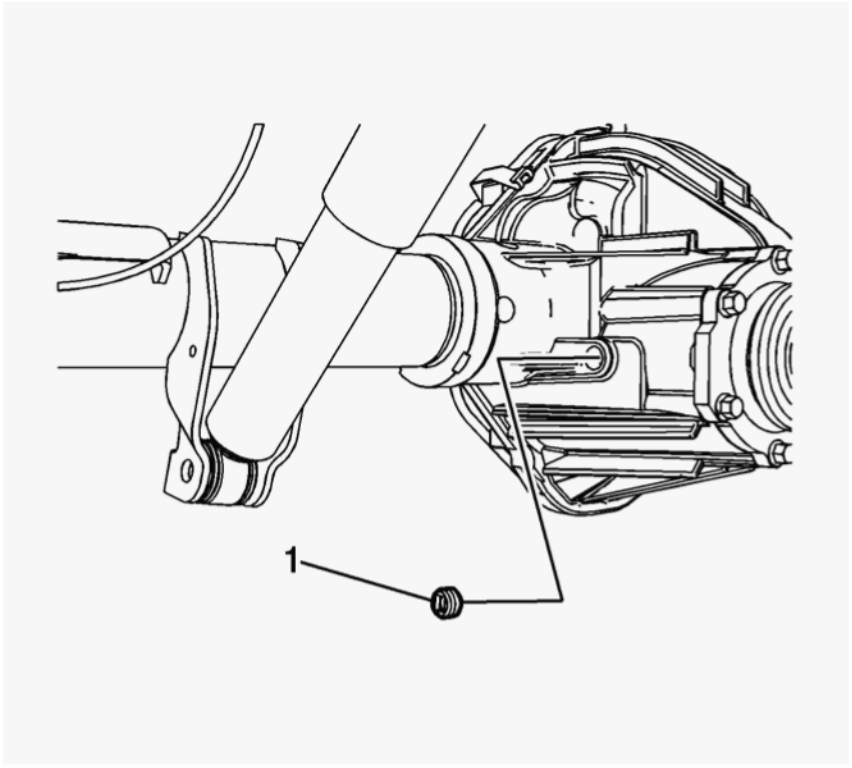


Fig. 38: Axle Fill Plug
Courtesy of GENERAL MOTORS COMPANY

3. Install the fill plug (1) and tighten to 75 N.m (55 lb ft).
4. Remove the support and 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.

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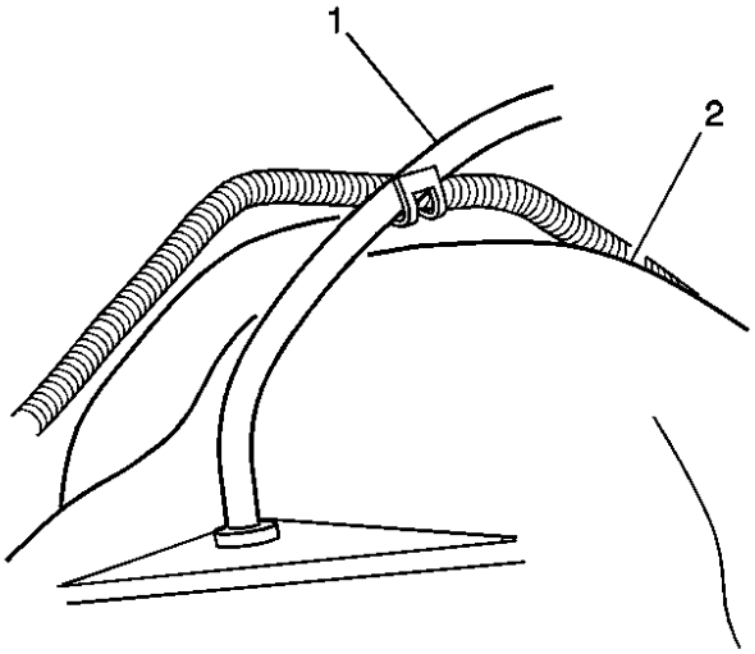


Fig. 39: Vent Hose & Rear Axle
Courtesy of GENERAL MOTORS COMPANY

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

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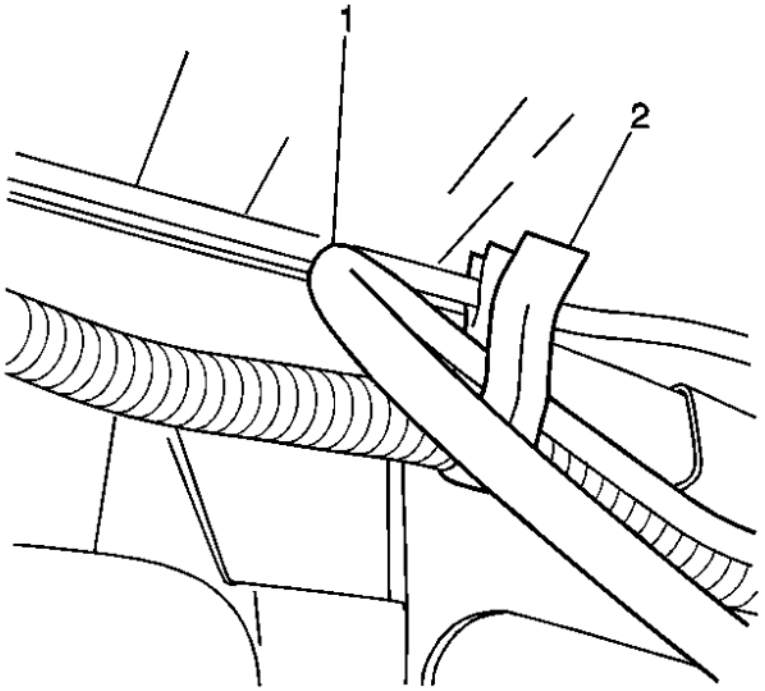


Fig. 40: Vent Hose & Frame Clip
Courtesy of GENERAL MOTORS COMPANY

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

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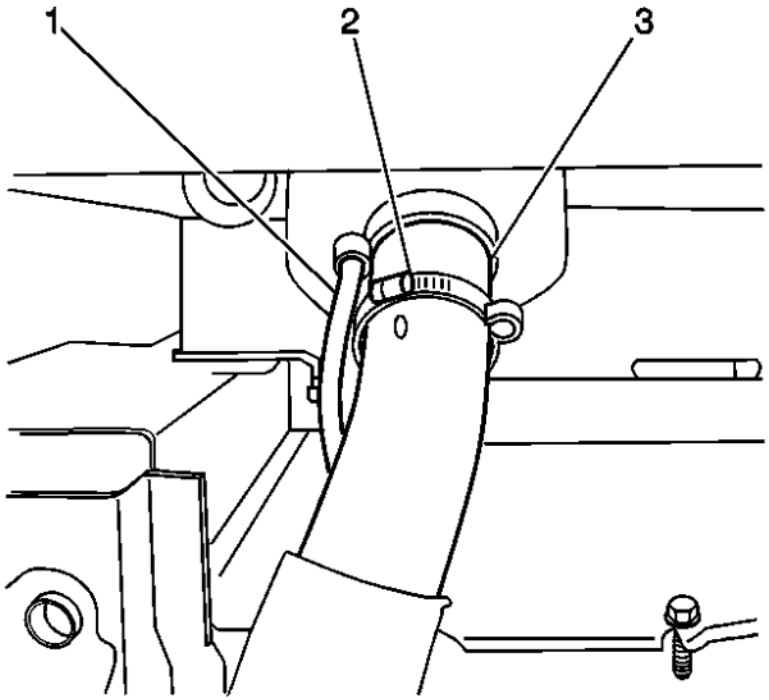


Fig. 41: Vent Hose & Filler Hose Clamp
Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

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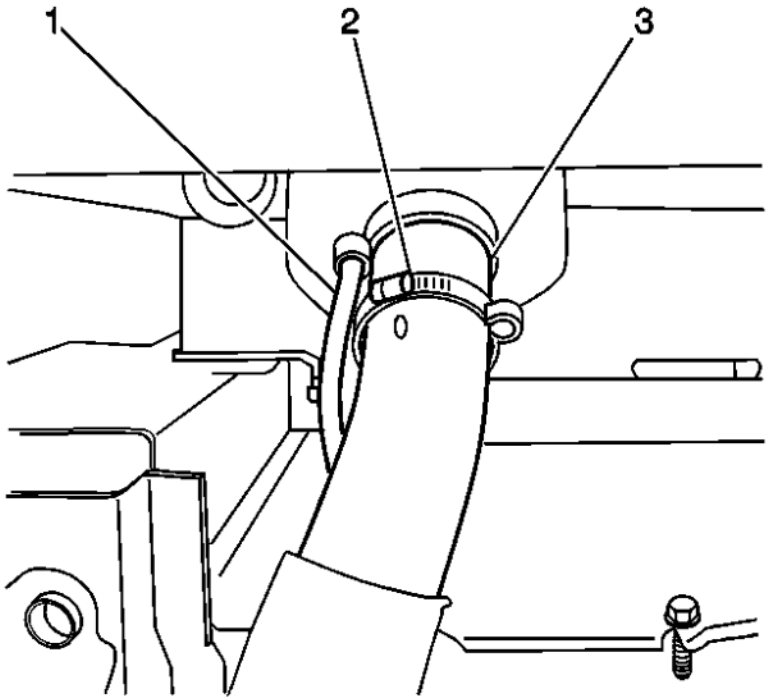


Fig. 42: Vent Hose & Filler Hose Clamp
Courtesy of GENERAL MOTORS COMPANY

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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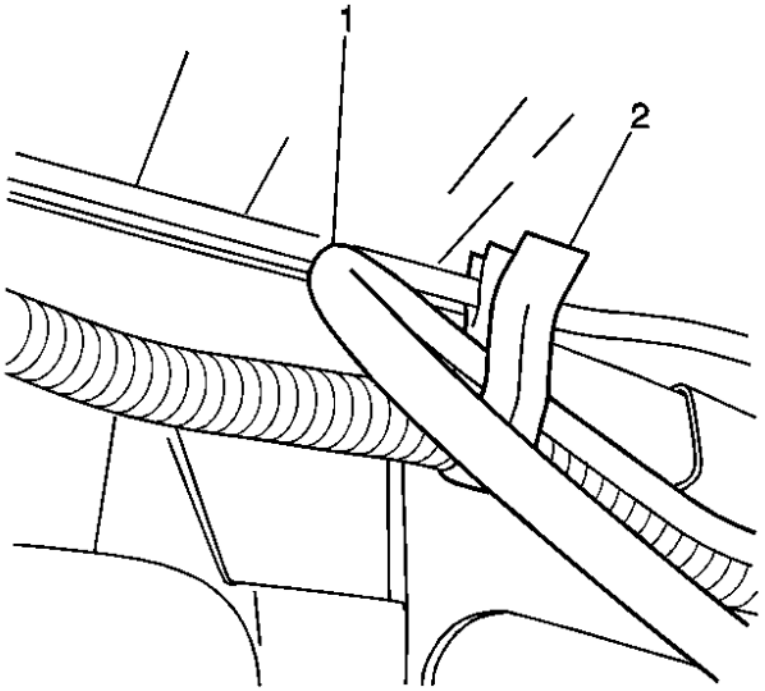


Fig. 43: Vent Hose & Frame Clip
Courtesy of GENERAL MOTORS COMPANY

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

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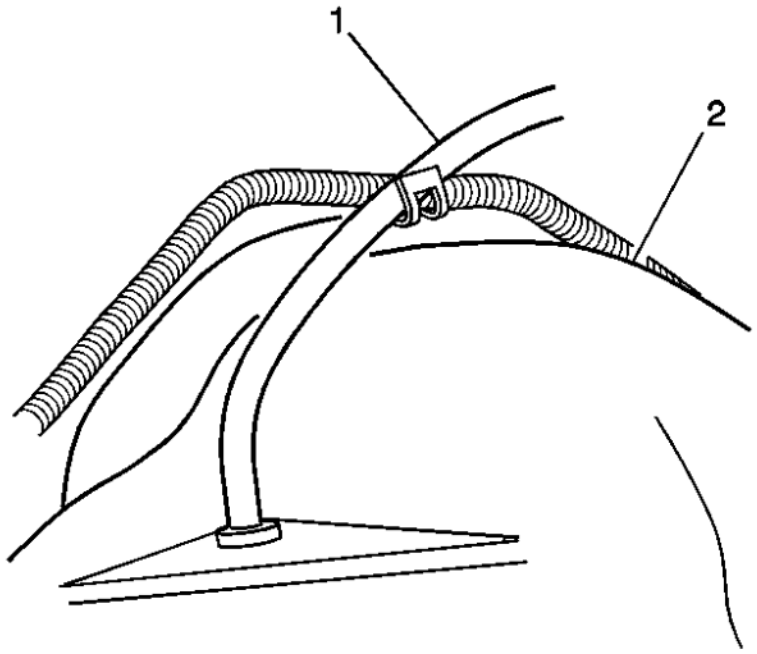


Fig. 44: Vent Hose & Rear Axle
Courtesy of GENERAL MOTORS COMPANY

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

REAR AXLE HOUSING COVER REPLACEMENT (8.6/9.5/9.7 INCH AXLE)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the rear axle. Refer to **Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)**.

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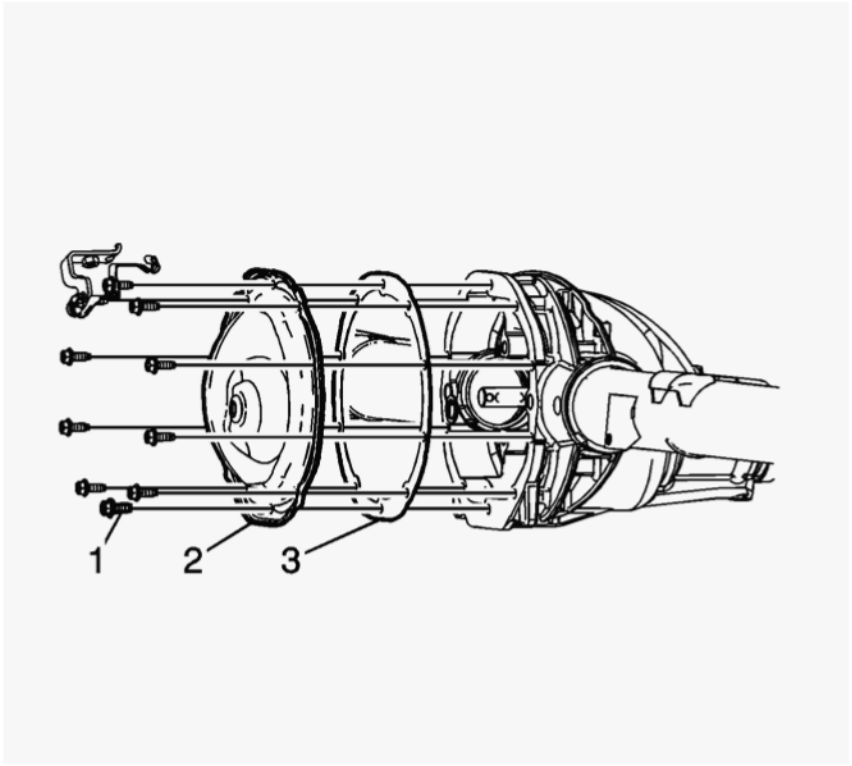


Fig. 45: Rear Axle Cover And Bolts
Courtesy of GENERAL MOTORS COMPANY

3. Remove the rear axle housing cover bolts (1).

NOTE: **DO NOT nick or cut the rear axle housing cover gasket.**

4. Remove the rear axle housing cover (2) and the gasket (3) from the axle housing.
5. If the rear axle housing cover gasket is found to be damaged, DO NOT re-use. Replace with NEW.
6. Drain the remaining axle lubricant into a suitable container.

Installation Procedure

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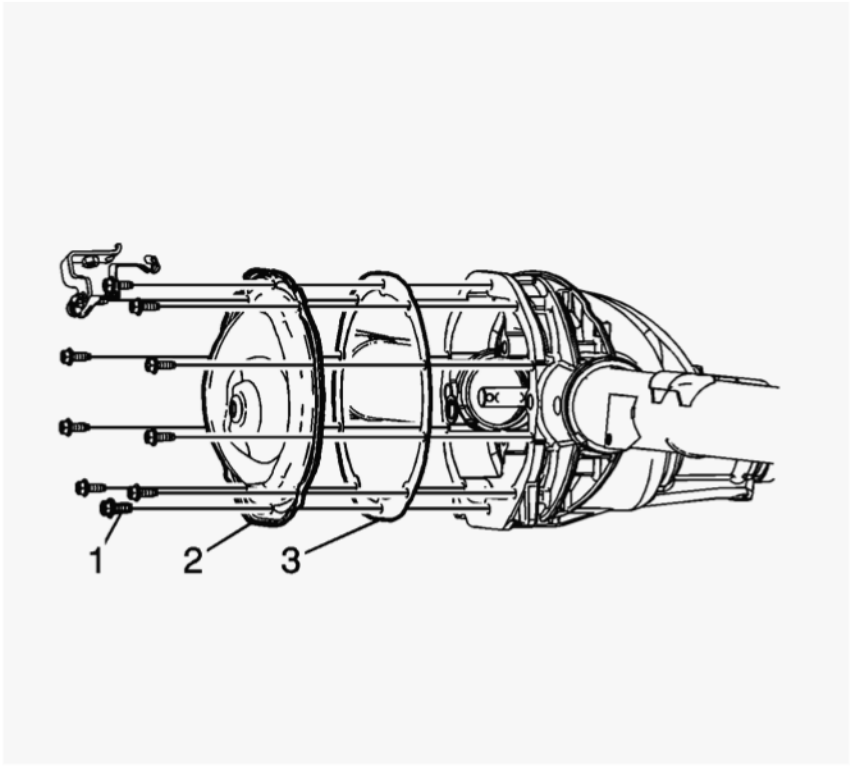


Fig. 46: Rear Axle Cover And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. If the gasket is to be re-used, clean the sealing surfaces of the rear axle housing and the rear axle cover with a suitable cleaner.
2. Install the rear axle housing cover gasket (3) and the NEW rear axle housing cover (2) to the rear axle housing.

CAUTION: **Refer to Fastener Caution .**

3. Install the rear axle housing cover bolts (1) and tighten to 20 N.m (15 lb ft) + 20 degrees.
4. Install the drain plug for the 9.5/9.76 inch axle. Refer to **Differential Oil Replacement (9.5/9.76 Inch Axle)**.
5. Fill the rear axle with the proper axle lubricant. Refer to **Rear Axle Lubricant Level Inspection (8.6, 9.5/9.76 Inch Axle)**.
6. Remove the support and lower the vehicle.

REAR AXLE HOUSING COVER REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

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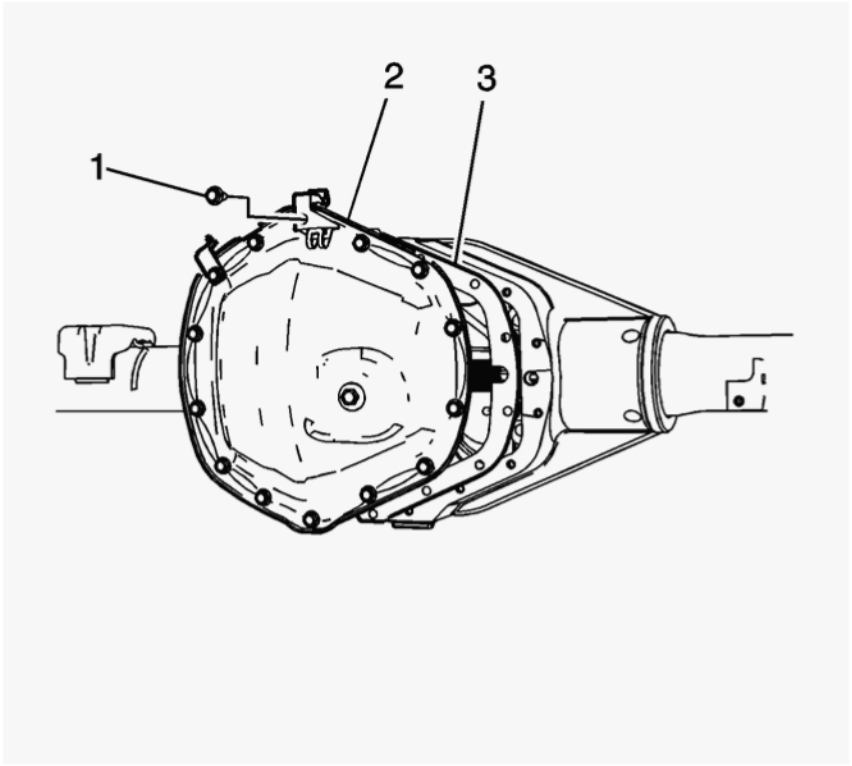


Fig. 47: Rear Axle Cover Bolts, Cover And Gasket
Courtesy of GENERAL MOTORS COMPANY

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the rear axle. Refer to **Differential Oil Replacement (10.5 Inch Axle)**.

NOTE: **Discard the axle housing cover bolts. Use NEW only.**

3. Remove the rear axle cover bolts (1) and cover (2).

Installation Procedure

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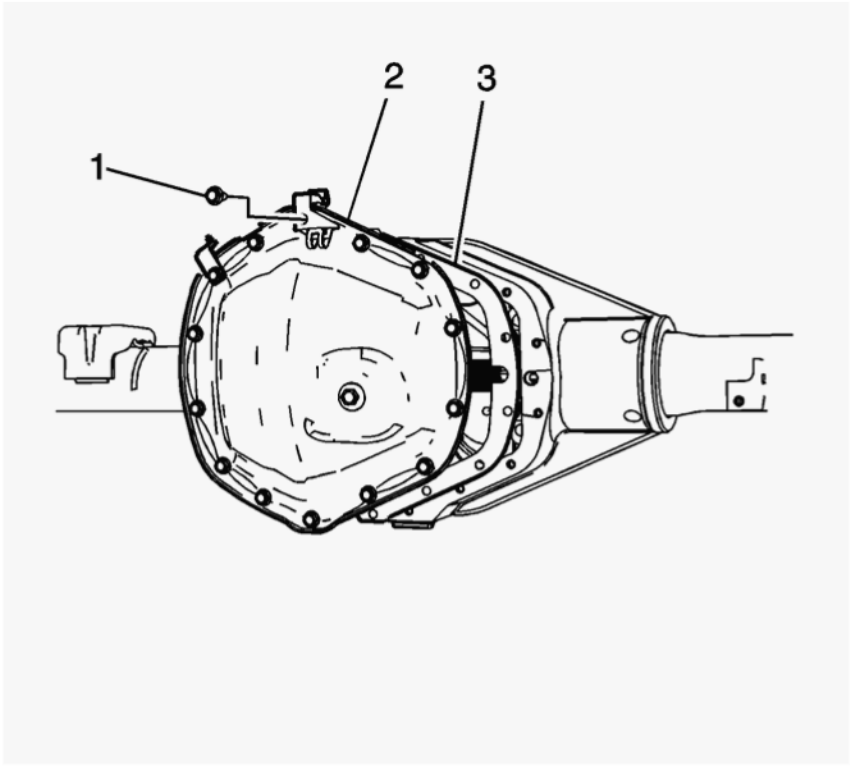


Fig. 48: Rear Axle Cover Bolts, Cover And Gasket
Courtesy of GENERAL MOTORS COMPANY

1. Position the axle housing cover (2) onto the rear axle.

CAUTION: Refer to Fastener Caution .

2. Install the NEW axle housing cover bolts (1) and tighten to 40 N.m (30 lb ft).
3. Fill the rear drive axle with the proper fluid. Refer to **Differential Oil Replacement (10.5 Inch Axle)**.
4. Remove the support and lower the vehicle.

REAR AXLE HOUSING COVER GASKET REPLACEMENT (8.6/9.5/9.76 INCH AXLE)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the rear axle. Refer to **Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)**.

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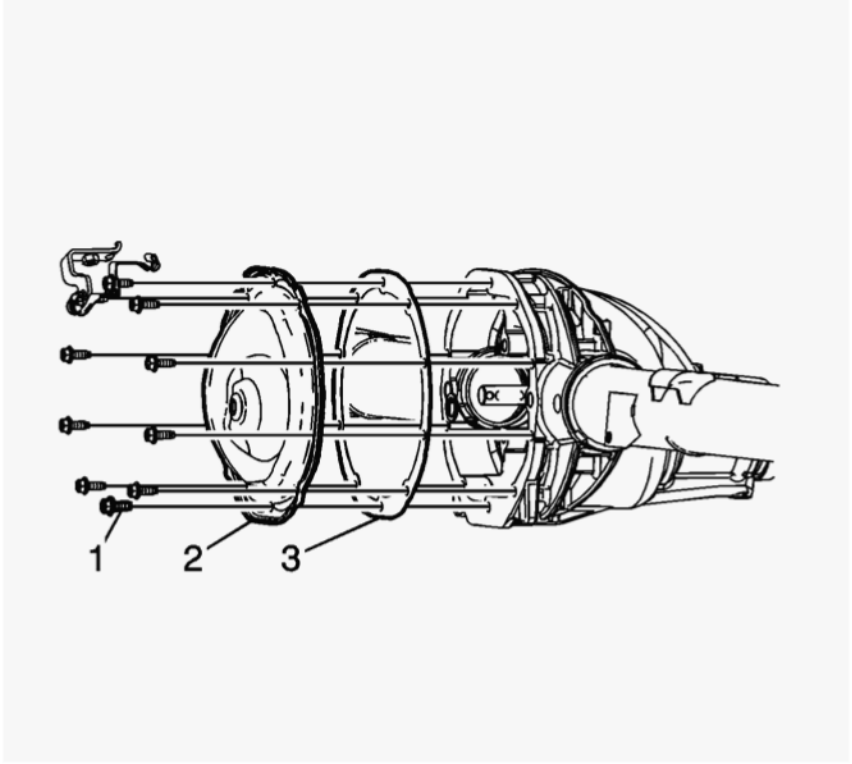


Fig. 49: Rear Axle Cover And Bolts
Courtesy of GENERAL MOTORS COMPANY

3. Remove the rear axle housing cover bolts (1).
4. Remove the rear axle housing cover (2) and the gasket (3) from the axle housing. Discard the gasket (3).
5. Drain the remaining axle lubricant into a suitable container.

Installation Procedure

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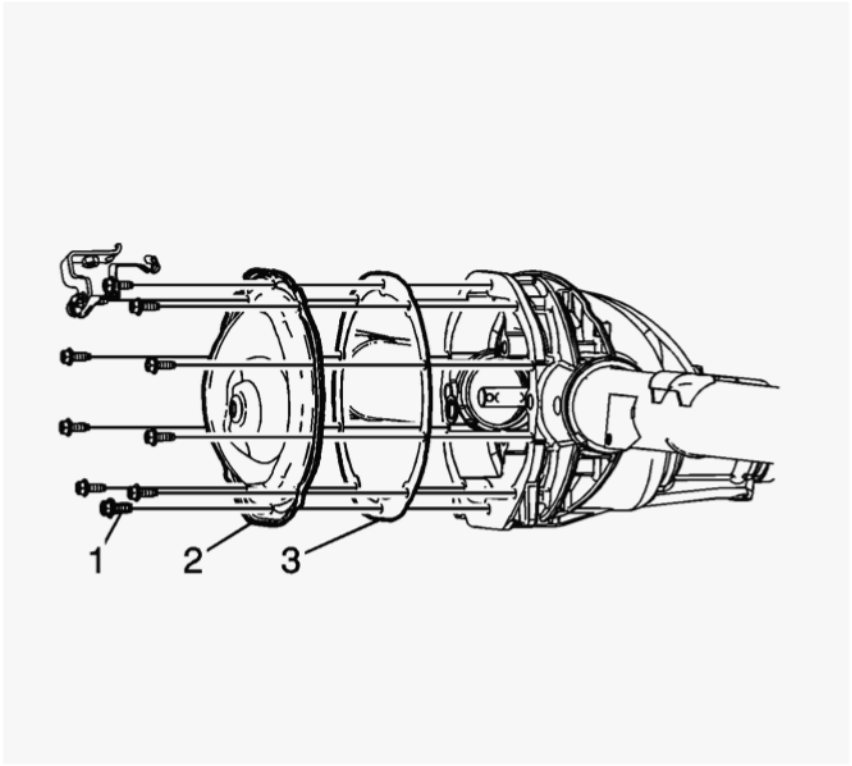


Fig. 50: Rear Axle Cover And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Clean the sealing surfaces of the rear axle housing and the rear axle cover with a suitable cleaner.
2. Install the NEW rear axle housing cover gasket (3) and the cover (2) to the rear axle housing.

CAUTION: **Refer to Fastener Caution .**

3. Install the rear axle housing cover bolts (1) and tighten to 30 N.m (20 lb ft).
4. Install the drain plug for the 9.5/9.76 inch axle. Refer to **Differential Oil Replacement (9.5/9.76 Inch Axle)**.
5. Fill the rear axle with the proper axle lubricant. Refer to **Rear Axle Lubricant Level Inspection (8.6, 9.5/9.76 Inch Axle)**.
6. Remove the support and lower the vehicle.

REAR AXLE HOUSING COVER GASKET REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

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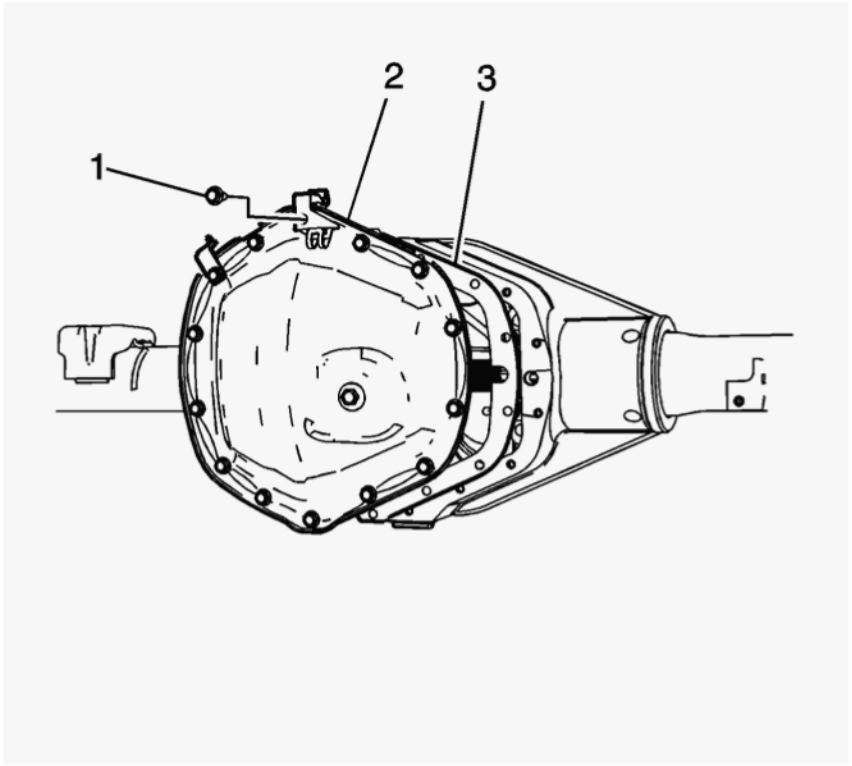


Fig. 51: Rear Axle Cover Bolts, Cover And Gasket
Courtesy of GENERAL MOTORS COMPANY

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Drain the rear axle. Refer to **Differential Oil Replacement (10.5 Inch Axle)**.

NOTE: **Discard the axle housing cover bolts. Use NEW only.**

3. Remove the rear axle cover bolts (1), cover (2), and the gasket (3).
4. Remove any gasket material from the rear axle housing and/or axle housing cover.

Installation Procedure

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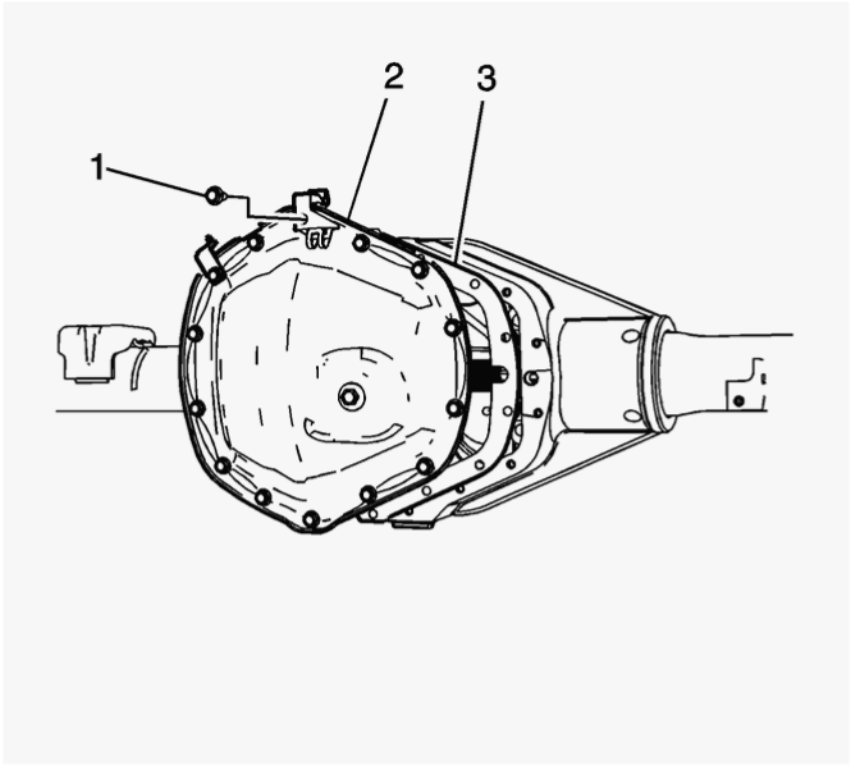


Fig. 52: Rear Axle Cover Bolts, Cover And Gasket
Courtesy of GENERAL MOTORS COMPANY

1. Position the axle housing cover (2) and the gasket (3) on the rear axle.

CAUTION: **Refer to Fastener Caution .**

2. Install the NEW axle housing cover bolts (1) and tighten to 40 N.m (30 lb ft).
3. Fill the rear drive axle with the proper fluid. Refer to **Differential Oil Replacement (10.5 Inch Axle)**.
4. Remove the support and lower the vehicle.

REAR AXLE SHAFT REPLACEMENT

Special Tools

- **J-2619-01** Slide Hammer W/ 1/2 x 13 Adapter
- **J-45859** Axle Shaft Remover/Installer

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

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .

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3. Remove the wheel speed sensor. Refer to **Rear Wheel Speed Sensor Replacement** .
4. Remove the brake caliper mounting bracket, if equipped. Refer to **Rear Brake Caliper Bracket Replacement (JD9)** **Rear Brake Caliper Bracket Replacement (J95)** .
5. Remove the rear axle housing cover and gasket. Refer to **Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)** **Rear Axle Housing Cover Replacement (10.5 Inch Axle)**.

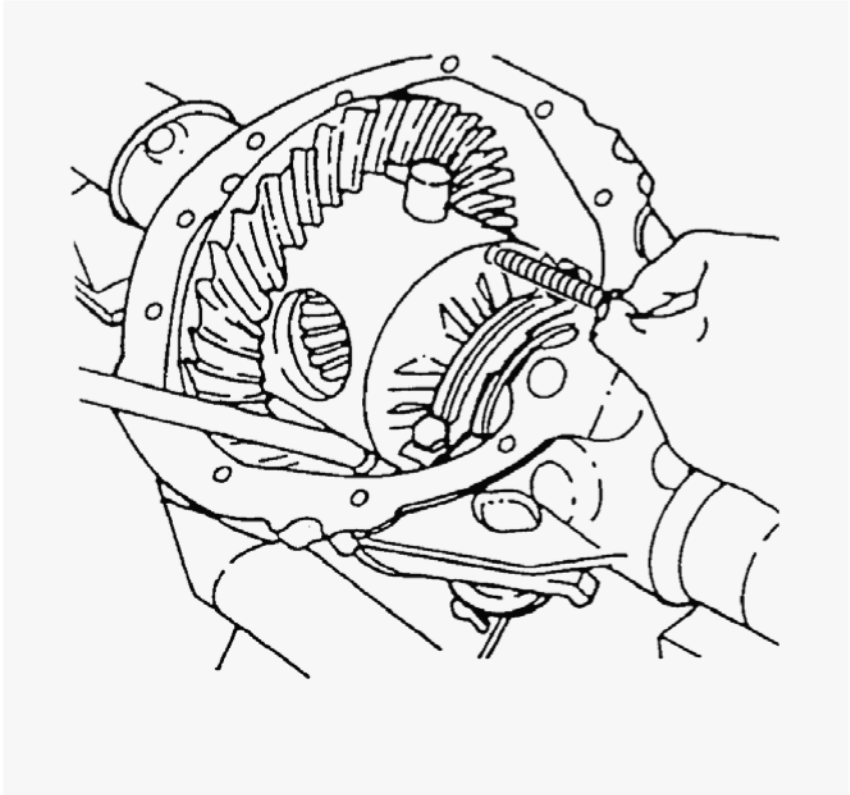


Fig. 53: Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Remove the and discard differential pinion gear shaft bolt.

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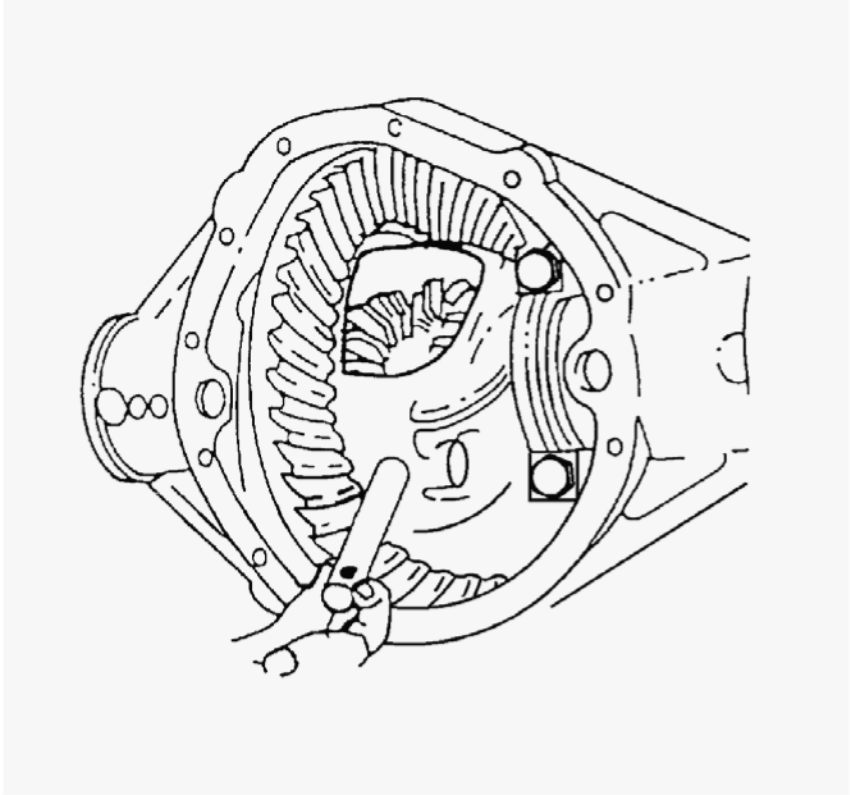


Fig. 54: Pinion Shaft
Courtesy of GENERAL MOTORS COMPANY

NOTE: **For those vehicles NOT equipped with the locking differential proceed to step 8. If the vehicle is equipped WITH the locking differential, proceed to step 9 and 10.**

7. Remove the differential pinion gear shaft.

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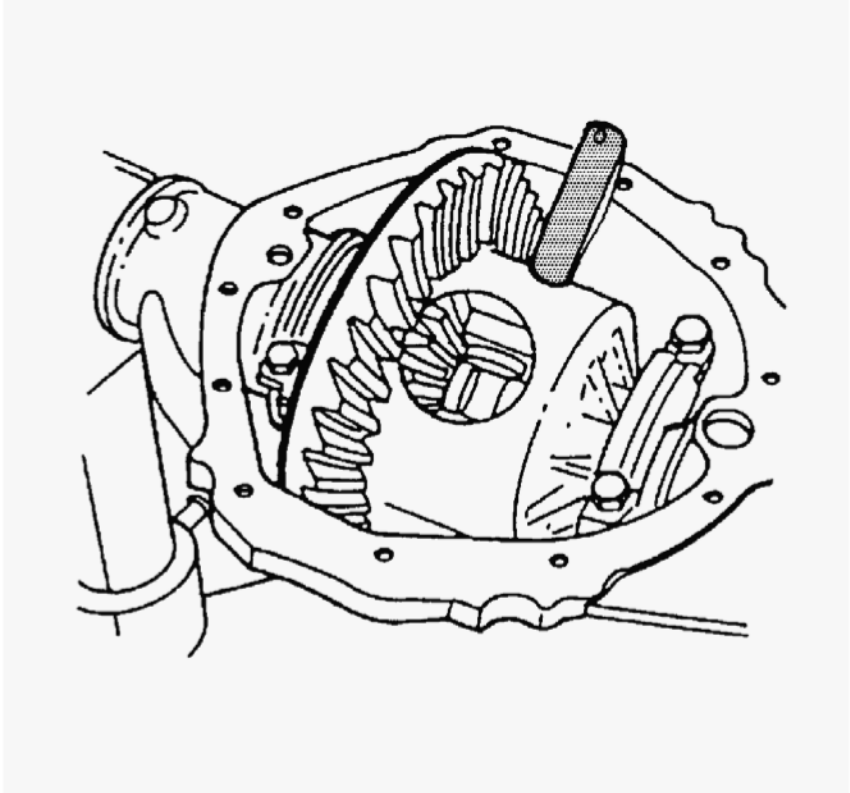


Fig. 55: Pinion Shaft Touching Housing
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Rotate the differential case until the differential pinion shaft just touches the rear axle housing.**

8. Remove the differential pinion gear shaft part way from the differential case.

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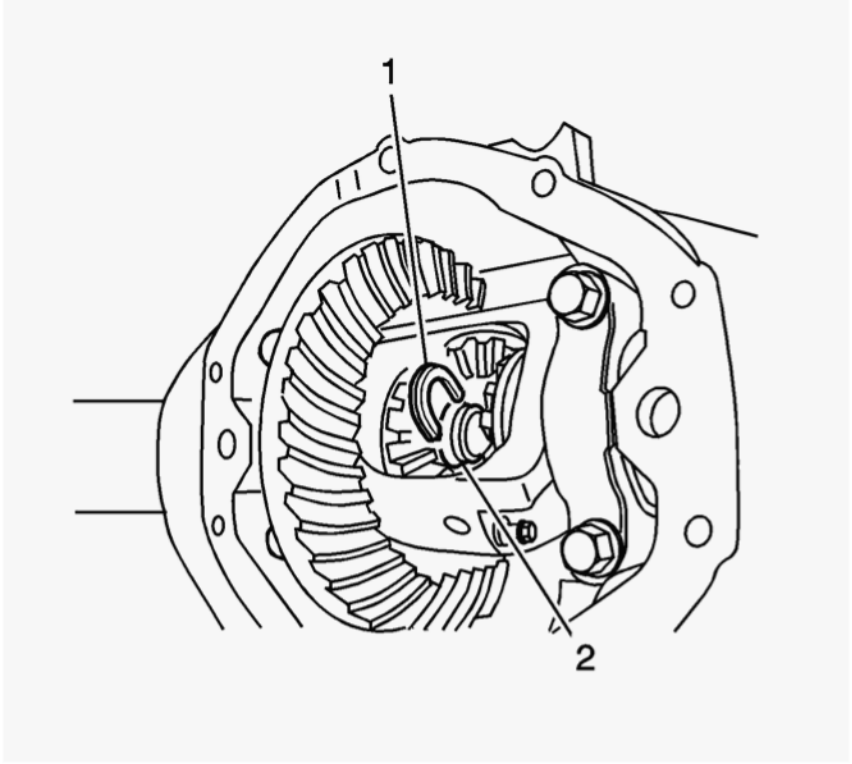


Fig. 56: Rear Axle Lock Ring
Courtesy of GENERAL MOTORS COMPANY

9. Use a screw driver, or similar tool to rotate the lock (1) until the lock (1) aligns with the thrust block.
10. Push in on the rear axle shaft (2) and remove the lock (1).

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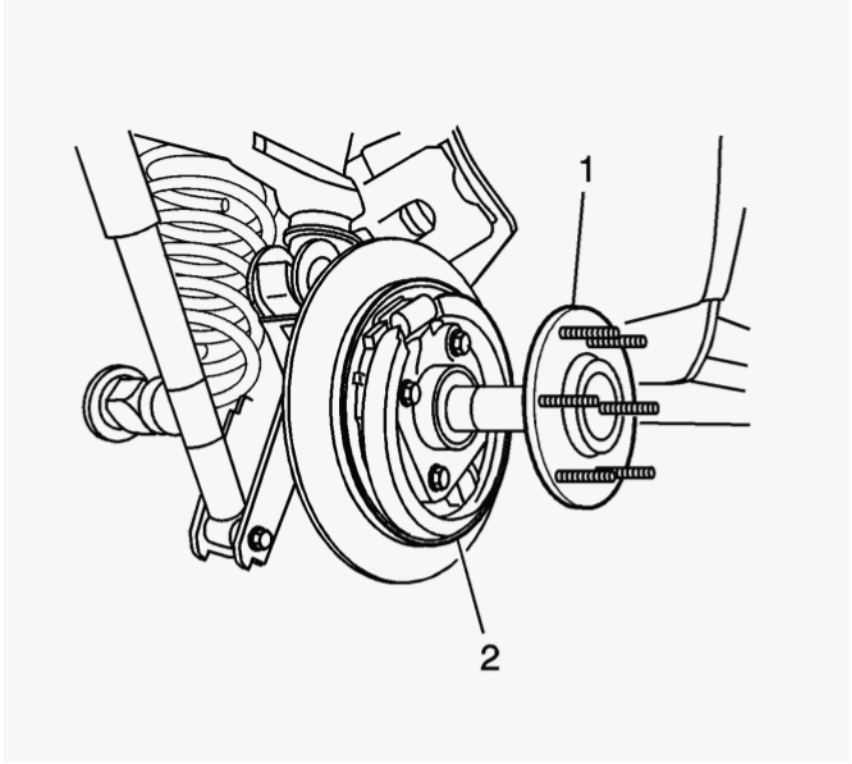


Fig. 57: Rear Axle Shaft And Brake Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If the rear axle shaft is difficult to remove, proceed to step 12.**

11. Remove the rear disc brake axle shaft (1) from the rear axle assembly (2), if equipped

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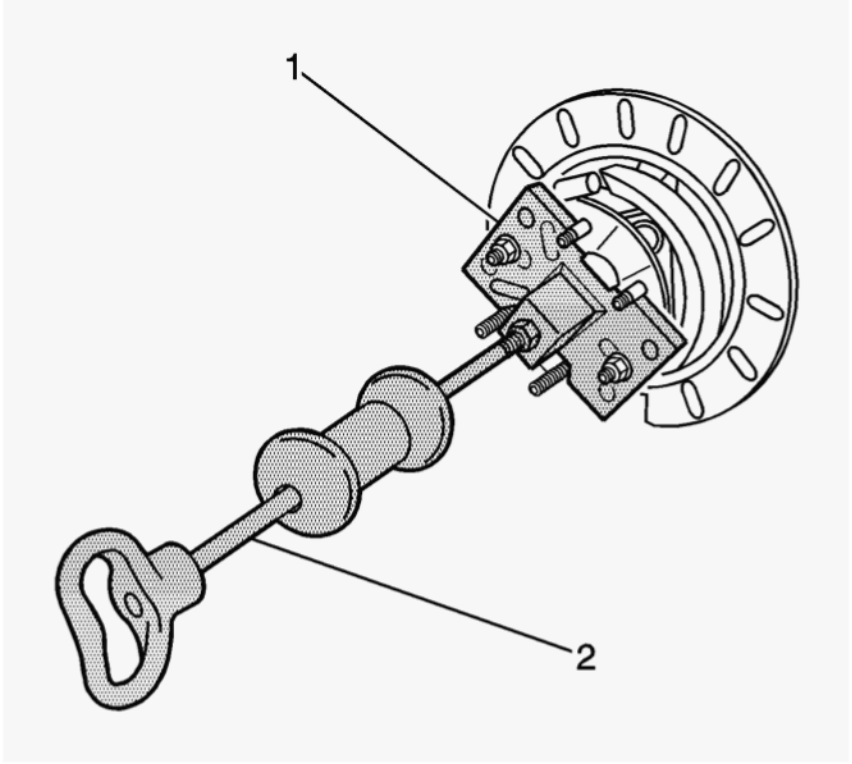


Fig. 58: Removing Axle Shaft
Courtesy of GENERAL MOTORS COMPANY

12. Using the **J-2619-01** hammer (2) and the **J-45859** remover/installer (1), remove the rear axle shaft from the rear axle assembly.
13. Replace the rear axle shaft seal and or bearing, if needed. Refer to **Rear Axle Shaft Seal Replacement**, and or **Rear Axle Shaft Bearing Replacement**.

Installation Procedure

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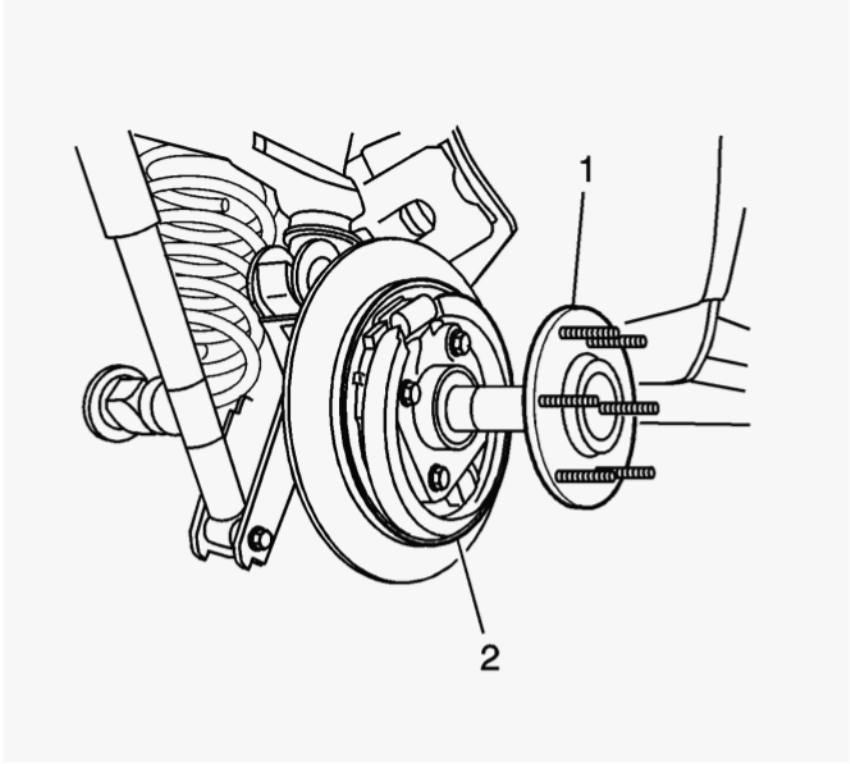


Fig. 59: Rear Axle Shaft And Brake Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: **When installing the rear axle shaft, ensure that the seal is not damaged.**

1. Install the disc brake axle shaft (1) in the rear axle assembly (2), if equipped.

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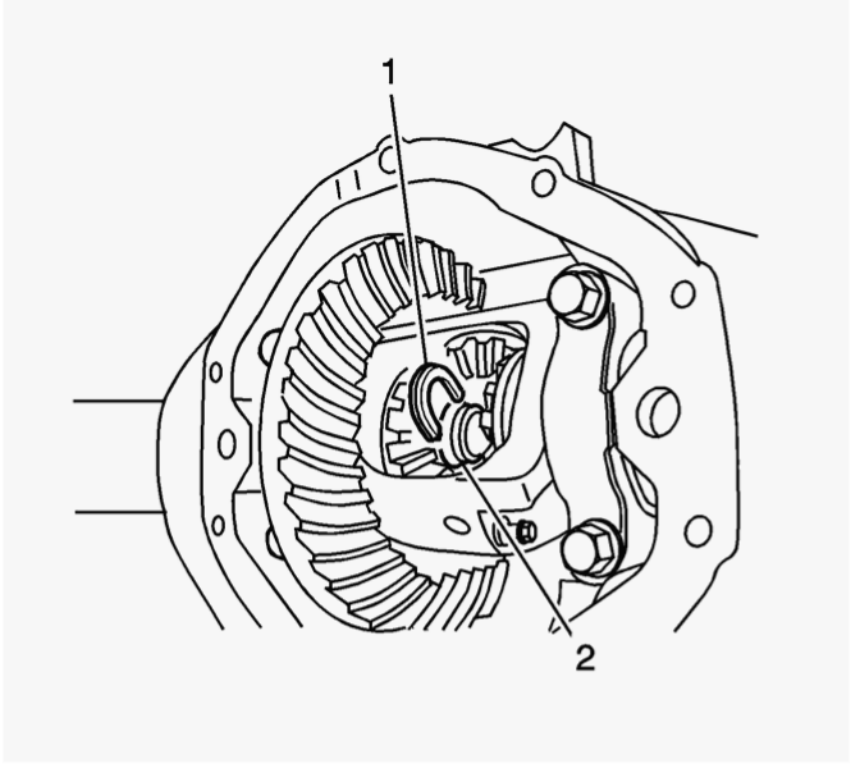


Fig. 60: Rear Axle Lock Ring
Courtesy of GENERAL MOTORS COMPANY

NOTE: **In steps 3 and 4, pull out on the axle shaft after the lock has been installed to ensure that the lock is seated properly.**

2. Install the lock (1) in the rear axle (2), without a locking differential.

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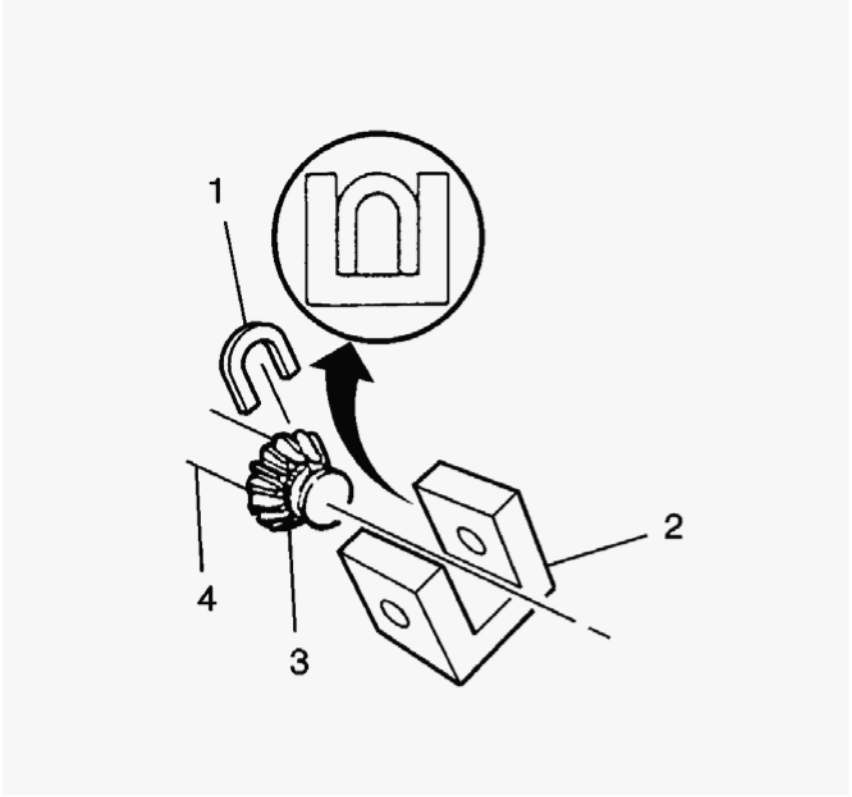


Fig. 61: Axle Shaft, Lock And Thrust Block
Courtesy of GENERAL MOTORS COMPANY

3. Install the lock (1) on the rear axle shaft (3), with a locking differential.

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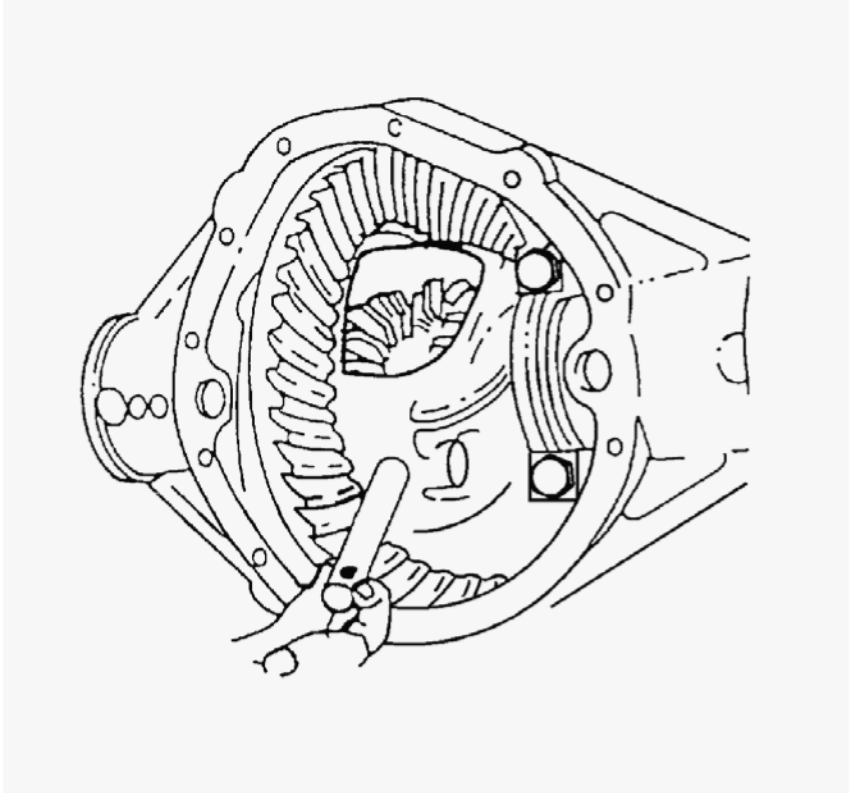


Fig. 62: Pinion Shaft
Courtesy of GENERAL MOTORS COMPANY

NOTE: **On axles with a locking differential, keep the differential pinion shaft slightly withdrawn.**

4. Install the differential pinion gear shaft.

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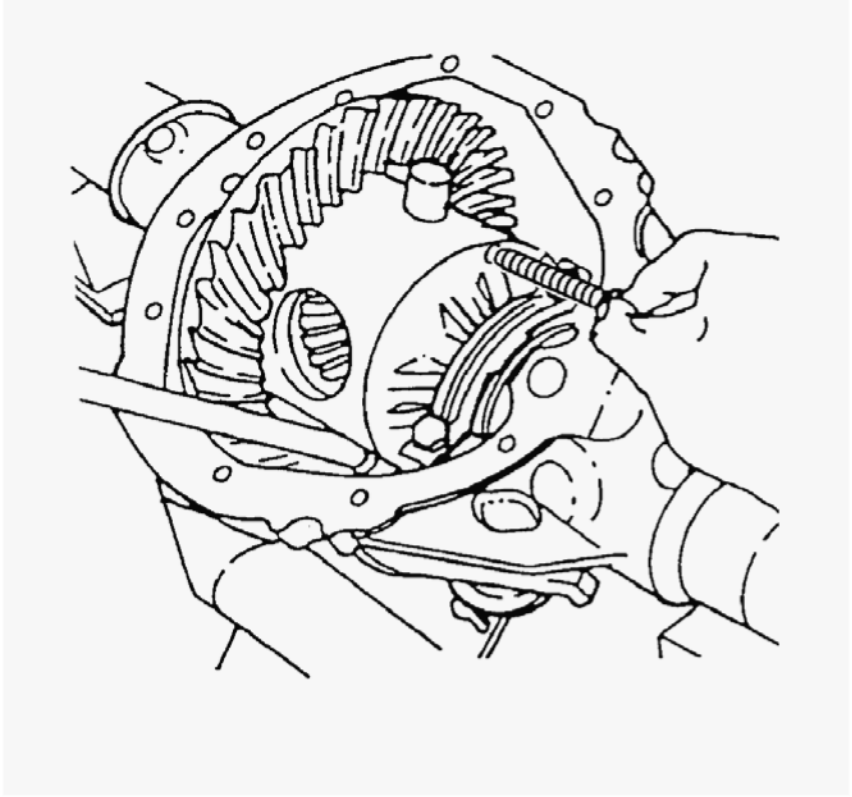


Fig. 63: Pinion Shaft Locking Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: **Refer to Fastener Caution .**

5. Install the NEW differential pinion gear shaft bolt and tighten to 34 N.m (25 lb ft) for the 8.6 inch axle and 50 N.m (37 lb ft) for the 9.5 inch axle.

NOTE: **End play is the in and out movement of the rear axle shaft. Radial play is the up and own movement in the rear axle shaft.**

6. Check the rear axle shaft end play and the radial play. The rear axle shaft end play should be 0.012 inch per side and the radial play should be 0.002-0.003 inch. If the rear axle shaft is NOT within the specifications, replace any excessively worn parts.
7. Install the rear axle housing cover and gasket. Refer to Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)Rear Axle Housing Cover Replacement (10.5 Inch Axle).
8. Install the wheel speed sensor. Refer to Rear Wheel Speed Sensor Replacement .
9. Install the brake caliper mounting bracket, if equipped. Refer to Rear Brake Caliper Bracket Replacement (JD9) Rear Brake Caliper Bracket Replacement (J95) .
10. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel) .
11. Remove the support and lower the vehicle. Refer to Lifting and Jacking the Vehicle .

REAR AXLE SHAFT SEAL REPLACEMENT

Special Tools

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- **J-2619-01** Slide Hammer W 1/2 x 13 Adapter
- **J-21128** Axle Pinion Oil Seal Installer
- **J-29713** Oil Seal Installer
- **J-44685** Rear Axle Seal and Bearing Remover
- **J-29712** Axle Bearing Remover
- **J-45857** VSES Wheel Bearing Remover

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .
3. Remove the rear axle housing cover. Refer to **Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)** **Rear Axle Housing Cover Replacement (10.5 Inch Axle)**.
4. Remove the axle shaft. Refer to **Rear Axle Shaft Replacement**.

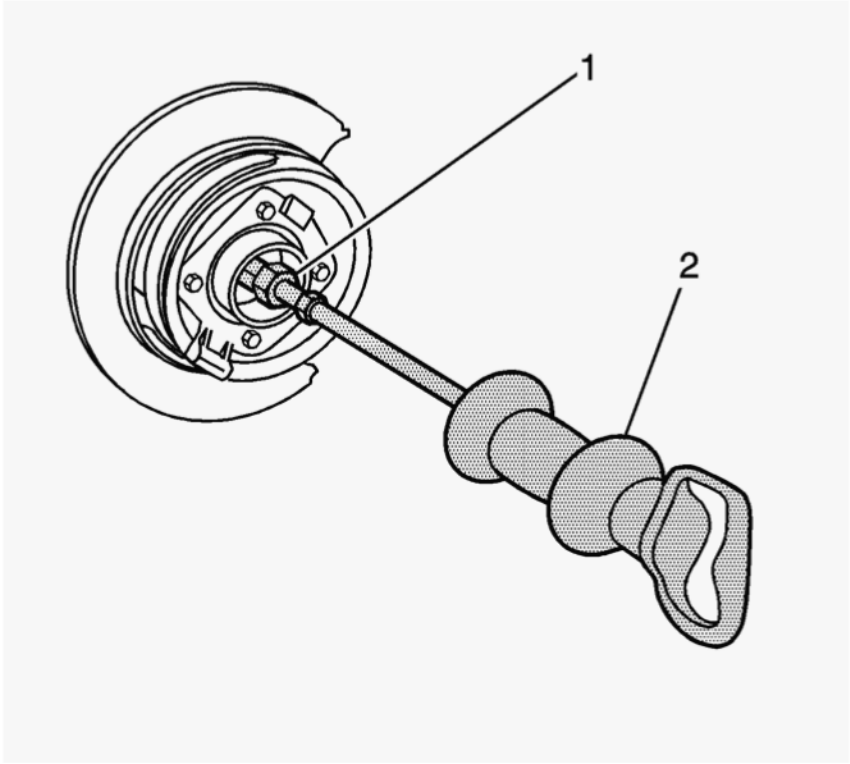


Fig. 64: Removing Axle Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

5. Using the **J-45857** remover (1) and the **J -2619-01** hammer (2), remove axle shaft seal.

Installation Procedure

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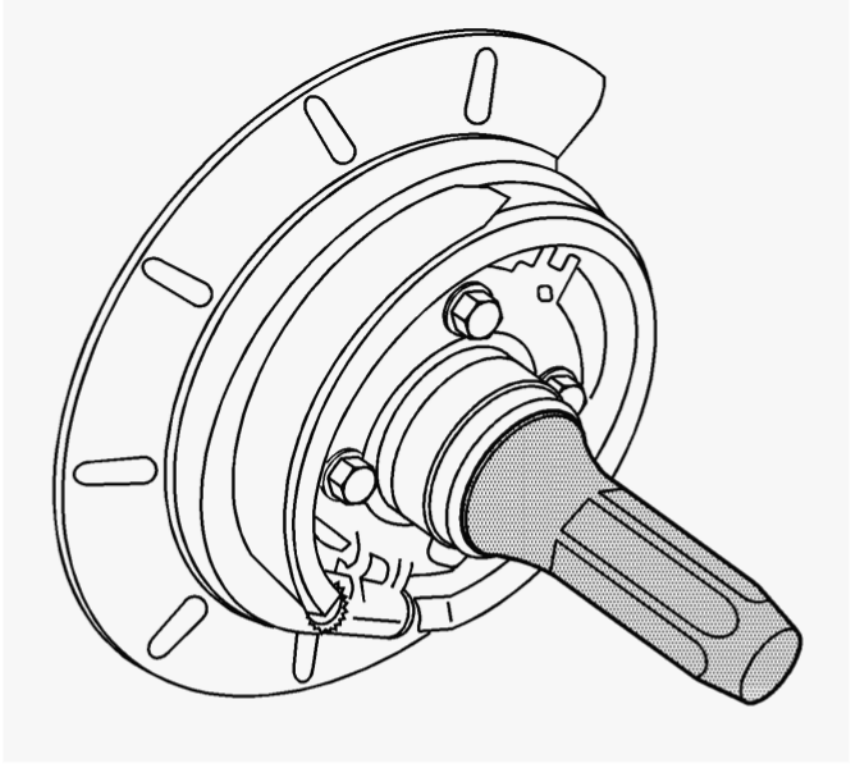


Fig. 65: Installing Axle Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

1. Using the **J-21128** installer, 8.6 and 9.5/9.76 inch axle, or the **J-29173** installer, 9.5 inch axle, install the axle shaft seal.
2. Drive the tool into the bore until the axle shaft seal bottoms flush with the tube.
3. Install the rear axle shaft. Refer to **Rear Axle Shaft Replacement**.
4. Install the rear axle housing cover. Refer to **Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)Rear Axle Housing Cover Replacement (10.5 Inch Axle)**.
5. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel)** .
6. Fill the rear axle. Refer to **Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)Differential Oil Replacement (10.5 Inch Axle)**.
7. Remove the support and lower the vehicle.

REAR AXLE SHAFT BEARING REPLACEMENT

Special Tools

- **J-2619-01** Slide Hammer W 1/2 x 13 Adapter
- **J-8092** Universal Driver Handle 3/4 x 10 inch
- **J-21128** Axle Pinion Oil Seal Installer
- **J-29713** Oil Seal Installer
- **J-23690** Axle Bearing Installer
- **J-44685** Rear Axle Seal and Bearing Remover

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- **J-29712** Axle Bearing Remover
- **J-45857** VSES Wheel Bearing Remover
- **J-45860** Tone Ring Installer

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .
3. Remove the rear axle housing cover. Refer to **Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)** **Rear Axle Housing Cover Replacement (10.5 Inch Axle)**.
4. Remove the axle shaft. Refer to **Rear Axle Shaft Replacement**.

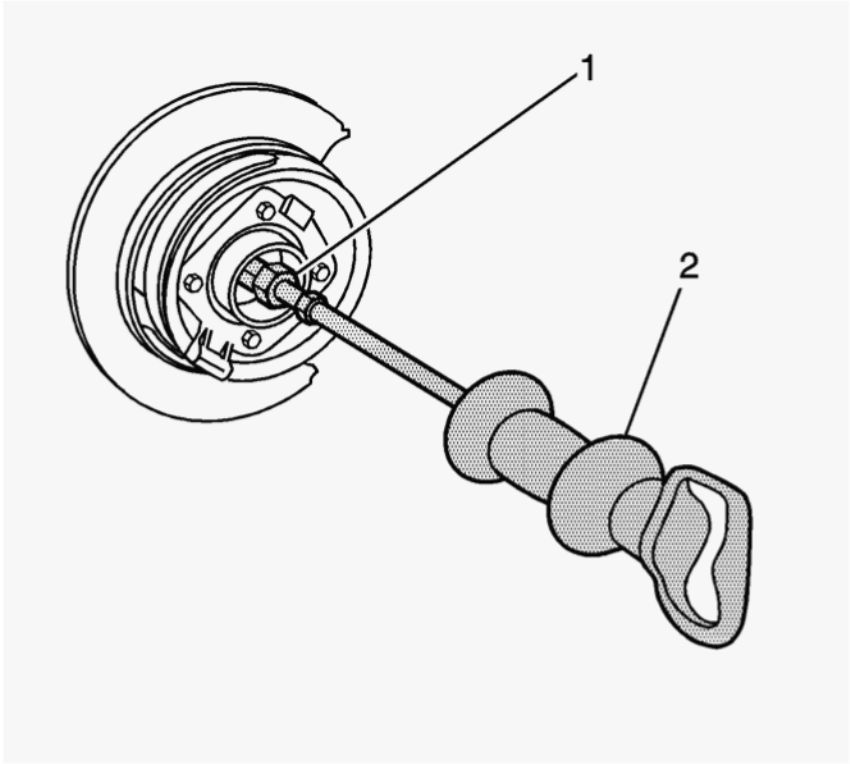


Fig. 66: Removing Rear Axle Shaft Seal, Bearing And Wheel Speed Sensor Reluctor Ring
Courtesy of GENERAL MOTORS COMPANY

5. Using the **J-45857** remover (1) and the **J-2619-01** hammer (2), remove axle shaft seal and bearing first, then follow with removal of reluctor/wheel speed sensor ring.

Installation Procedure

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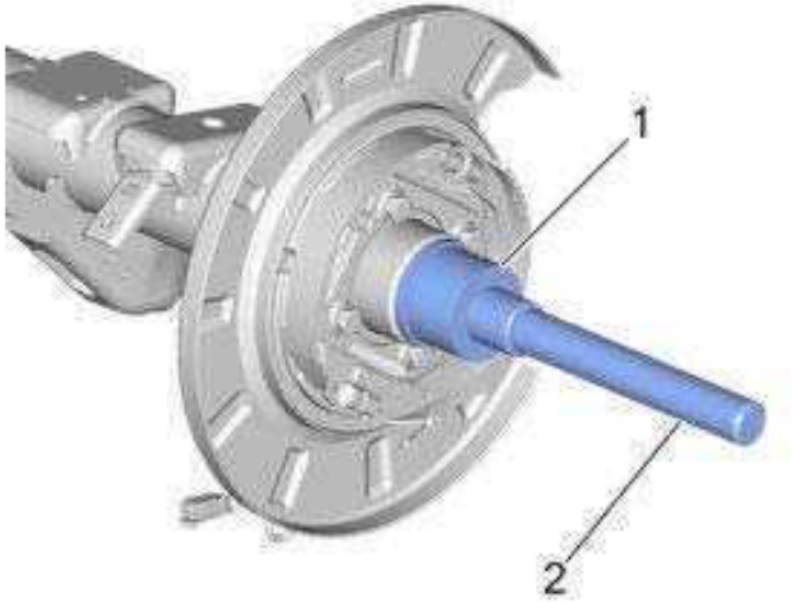


Fig. 67: Installing Rear Wheel Speed Sensor/Reluctor Ring
Courtesy of GENERAL MOTORS COMPANY

1. Install the rear wheel speed sensor/reluctor ring, using **J-45860** ring installer (1) and the **J-8092** driver (2). Refer to **Wheel Speed Sensor Reluctor Ring Replacement** .

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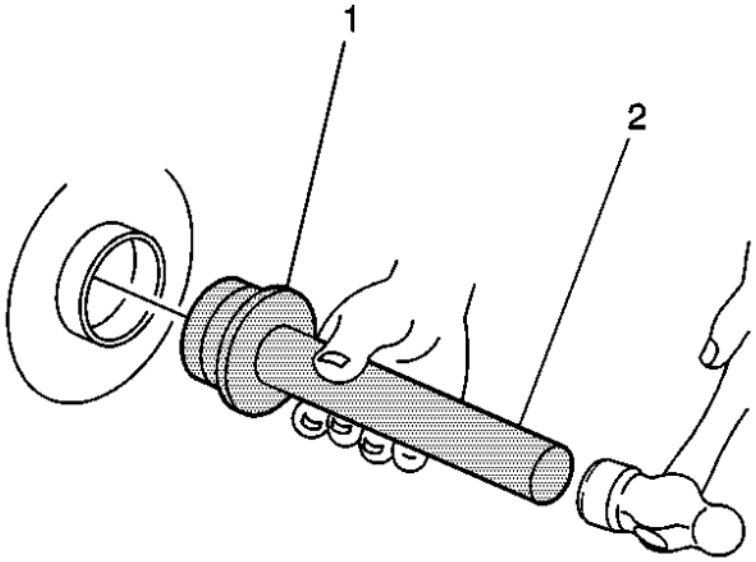


Fig. 68: Installing Axle Shaft Bearing
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the axle shaft bearing is fully seated in the rear axle shaft housing.**

2. Using the **J-23690** installer (1) and the **J-8092** driver (2), install the axle shaft bearing.

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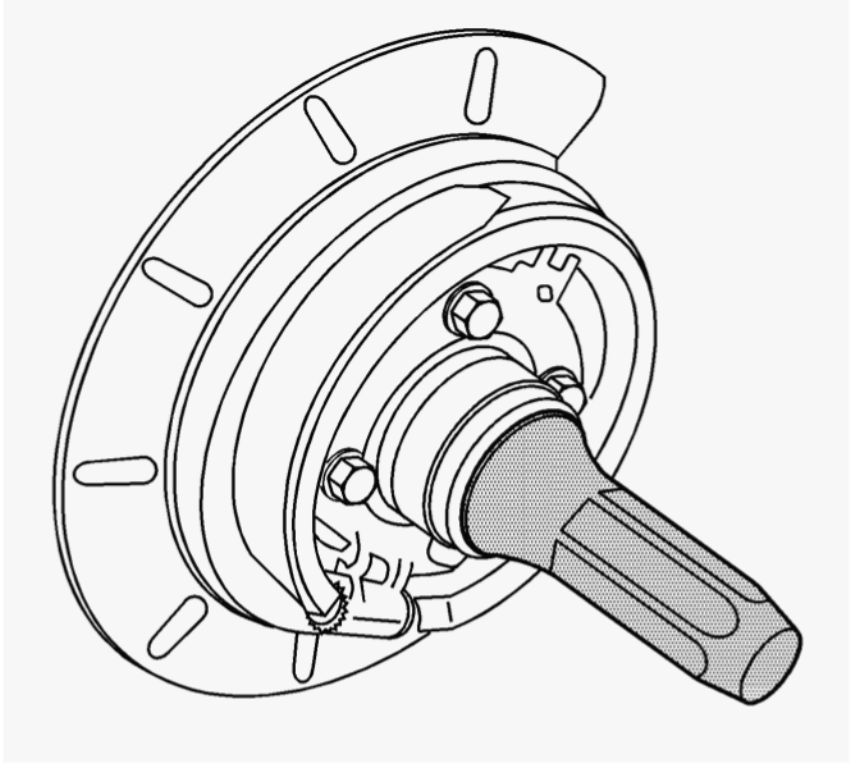


Fig. 69: Installing Axle Shaft Seal
Courtesy of GENERAL MOTORS COMPANY

3. Using the **J-21128** installer, 8.6 and 9.5/9.76 inch axle, or the **J-29173** installer, 9.5 inch axle, install the axle shaft seal.
4. Drive the tool into the bore until the axle shaft seal bottoms flush with the tube.
5. Install the rear axle shaft. Refer to **Rear Axle Shaft Replacement**.
6. Install the rear axle housing cover. Refer to **Rear Axle Housing Cover Replacement (8.6/9.5/9.7 Inch Axle)Rear Axle Housing Cover Replacement (10.5 Inch Axle)**.
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel)** .
8. Fill the rear axle. Refer to **Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)Differential Oil Replacement (10.5 Inch Axle)**.
9. Remove the support and lower the vehicle.

REAR AXLE SHAFT AND GASKET REPLACEMENT (10.5 INCH AXLE)

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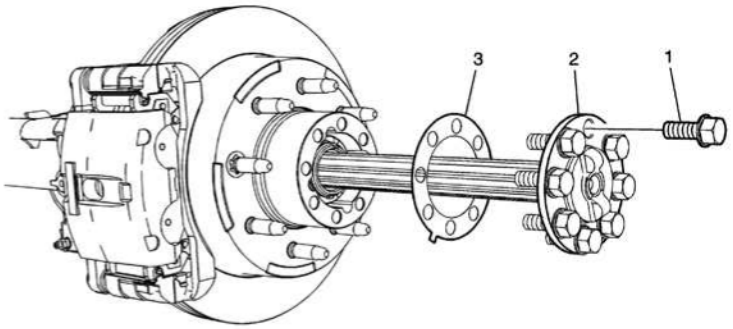


Fig. 70: Rear Axle Shaft And/Or Gasket (10.5 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .	
1	Axle Shaft Bolt (Qty: 8) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 225 N.m (167 lb ft)
2	Rear Axle Shaft
3	Rear Axle Shaft Gasket **NOTE:** • **When installing the NEW gasket, apply a small amount of clean grease to hold the gasket in place while**

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Callout	Component Name
	aligning the mounting hole in the axle shaft and the hub. • HD 11.5 Dual Rear Wheel Axle ONLY - When installing axle shaft, use caution and proceed slowly when aligning shaft during insertion through the inboard mounted rear wheel speed sensor tone ring splines on dual rear wheel HD models. • Slowly insert the axle shaft through the spindle and tube until the shaft stops against the inboard tone ring.

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Callout	Component Name
	• Carefully lift the inboard end of the axle shaft by pivoting the axle shaft on the spindle while grasping the outboard end of the axle shaft. • Slowly insert the axle shaft spline into the tone ring. If the tone ring and axle shaft splines to do not at first fully engage, rotate the axle shaft slightly and re-attempt to engage tone ring splines. • Once wheel speed sensor tone ring splines have been engaged by axle shaft, the axle shaft will have

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Callout	Component Name
	to be carefully aligned again when inserting the shaft finally into the splines of the differential side gears • Failure to use caution regarding the rear wheel speed sensor ring could result in damage to sensor ring and/or sensor ring retainer. If sensor ring and or retainer are damaged they must be replaced.

REAR WHEEL HUB REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **CH 49794** Axle Hub Nut Socket
- **CH-50636** Axle Hub Nut Socket
- **DT 50289** Differential Bearing and Hub Seal Installer
- **DT 50290** Wheel Bearing Installer Outer Bearing Cup
- **DT 50291** Wheel Bearing Race Installer - Outer
- **DT 50292** Wheel Bearing Race Installer - Inner

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- **J 8092** Universal Driver Handle-3/4 x 10 inch

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

Removal Procedure

NOTE:
- **The wheel speed sensor ring is NOT serviced separately. The hub and wheel speed senor ring are serviced as an assembly.**
- **The wheel hub seal must be replaced anytime the wheel hub assembly is removed from the axle housing.**

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .

NOTE: **In the following service procedure, it is not necessary to remove the brake caliper from the bracket.**

3. Remove the brake caliper bracket. Refer to **Rear Brake Caliper Bracket Replacement (JD9)** **Rear Brake Caliper Bracket Replacement (J95)** .
4. Remove the axle shaft. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**.

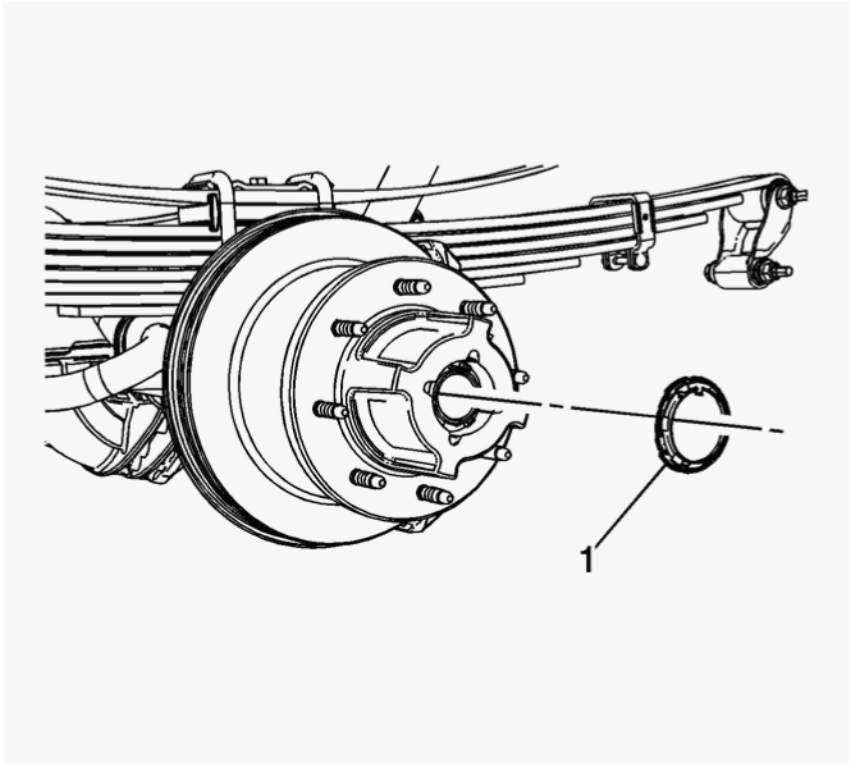


Fig. 71: Adjuster Nut Retainer
Courtesy of GENERAL MOTORS COMPANY

5. Remove the adjuster nut retainer (1).

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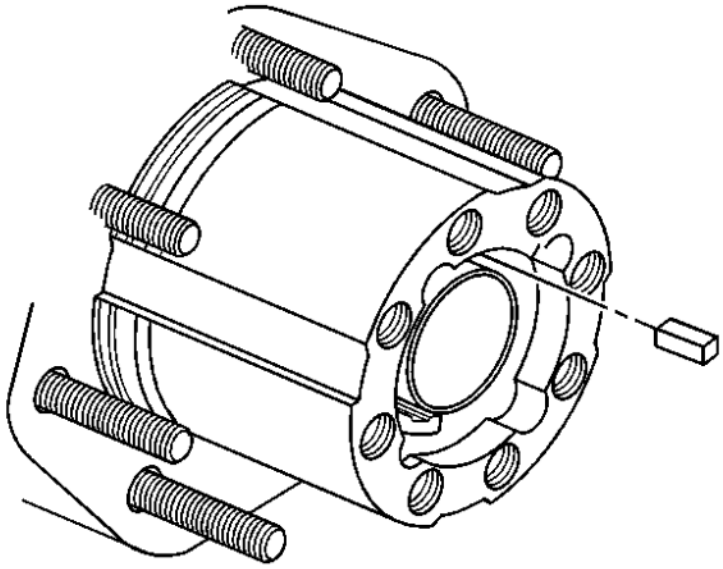


Fig. 72: Removing Key
Courtesy of GENERAL MOTORS COMPANY

6. Remove the key.

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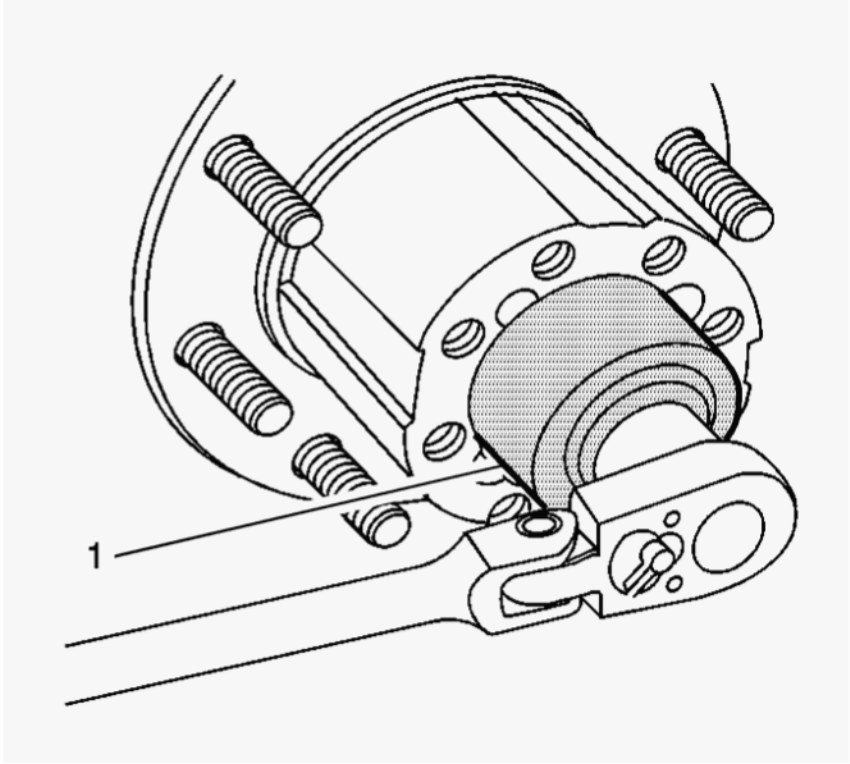


Fig. 73: Adjusting Nut And Special Tool
Courtesy of GENERAL MOTORS COMPANY

7. Using the **CH 49794** socket or the **CH 50636** socket (1), loosen the adjusting nut.

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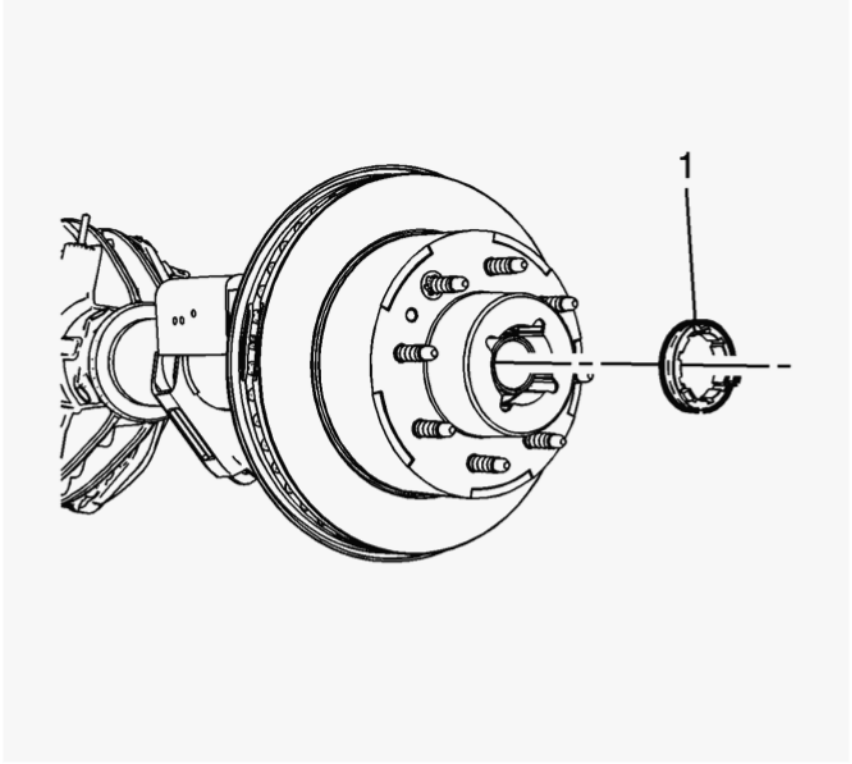


Fig. 74: Adjuster Nut
Courtesy of GENERAL MOTORS COMPANY

8. Remove the adjusting nut.

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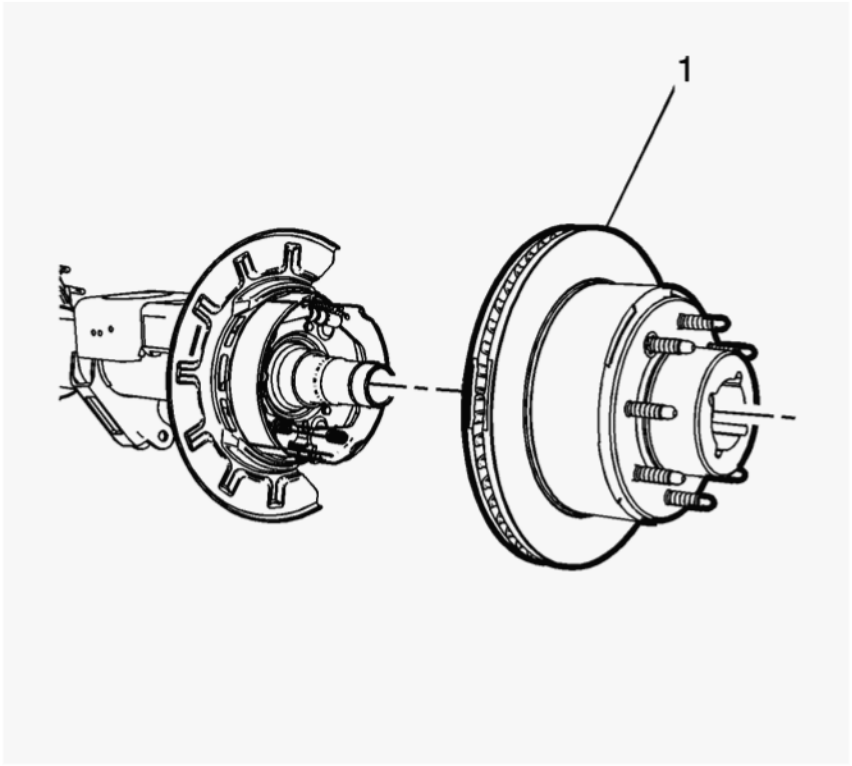


Fig. 75: Wheel Hub/Brake Rotor Assembly
Courtesy of GENERAL MOTORS COMPANY

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

9. Remove the wheel hub/brake rotor assembly (1) from the axle housing.
10. Remove the rotor, if necessary. Refer to Rear Brake Rotor Replacement (JD9) Rear Brake Rotor Replacement (J95) .
11. Using a suitable seal removal tool, remove the oil seal from the wheel hub.

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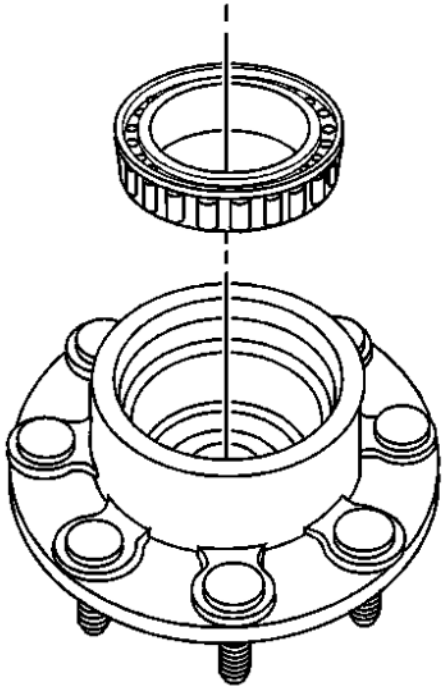


Fig. 76: Inner Hub Bearing
Courtesy of GENERAL MOTORS COMPANY

12. Remove the inner hub bearing.

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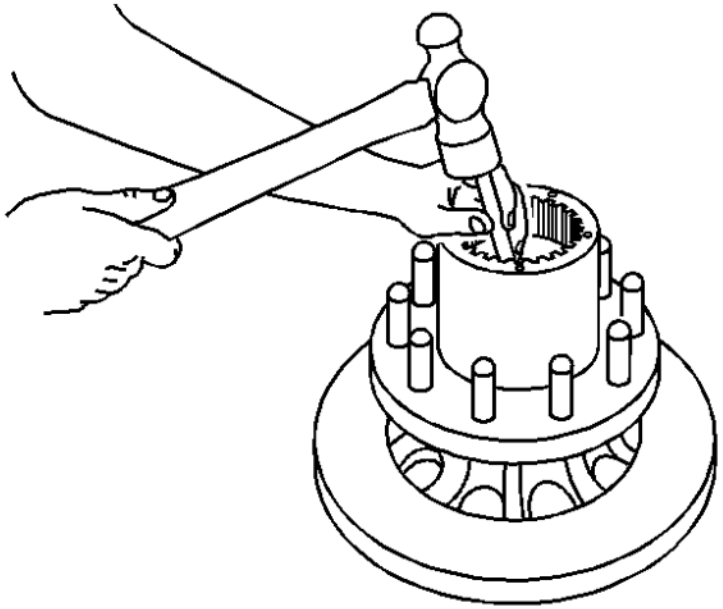


Fig. 77: Removing Inner Hub Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

13. Using a brass drift and a hammer, remove the inner hub bearing cup.

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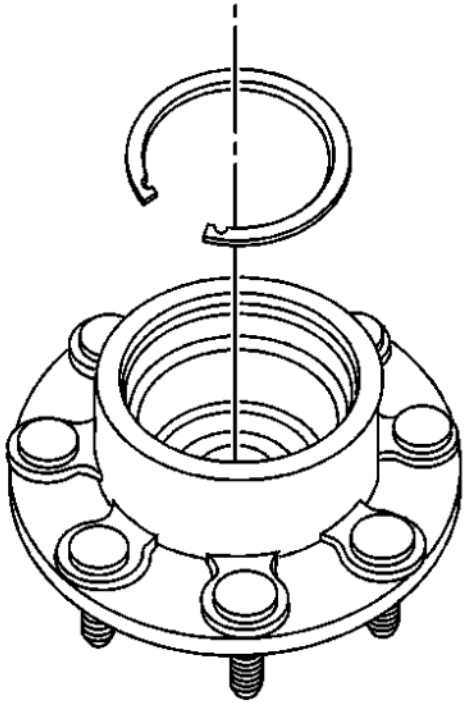


Fig. 78: Wheel Hub Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

14. Remove the retaining ring from the wheel hub.

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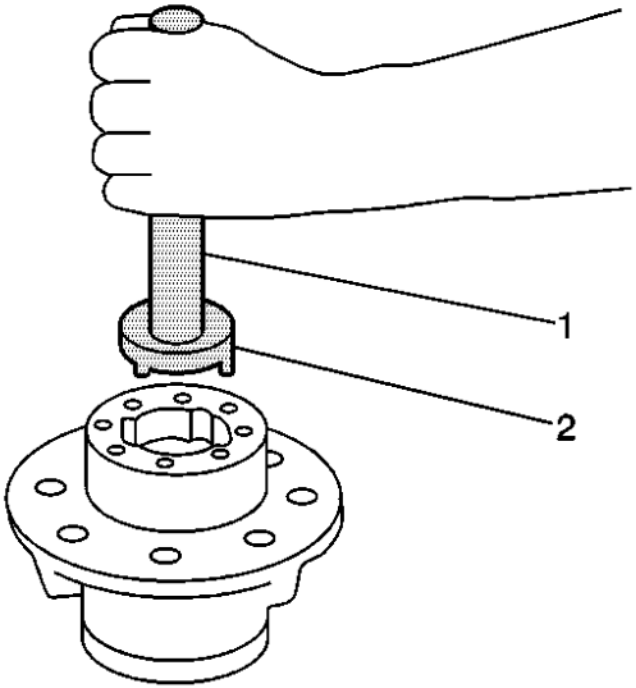


Fig. 79: Outer Hub Bearing & Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

15. Using the **DT 50291** installer (2) and the **J 8092** handle (1), remove the outer hub bearing and bearing cup.

Installation Procedure

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

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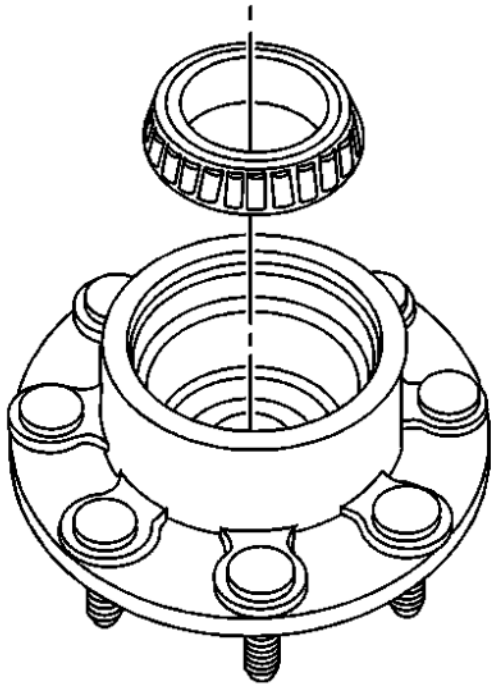


Fig. 80: Wheel Hub Outer Bearing
Courtesy of GENERAL MOTORS COMPANY

2. Install the outer bearing into the NEW wheel hub.

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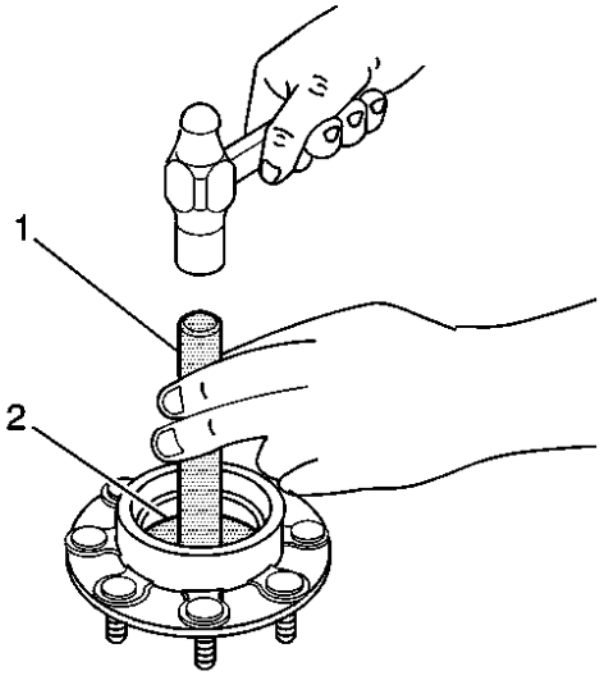


Fig. 81: Driving Bearing Cup Into Wheel Hub
Courtesy of GENERAL MOTORS COMPANY

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

3. Using the **DT 50290** installer (2) and the **J 8092** handle (1), install the outer bearing cup into the wheel hub.

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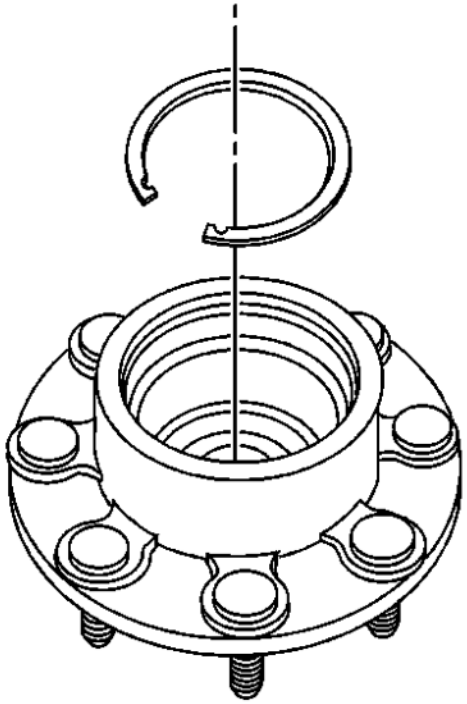


Fig. 82: Wheel Hub Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the retaining ring is fully and evenly seated in the groove.**

4. Install the retaining ring into the groove.

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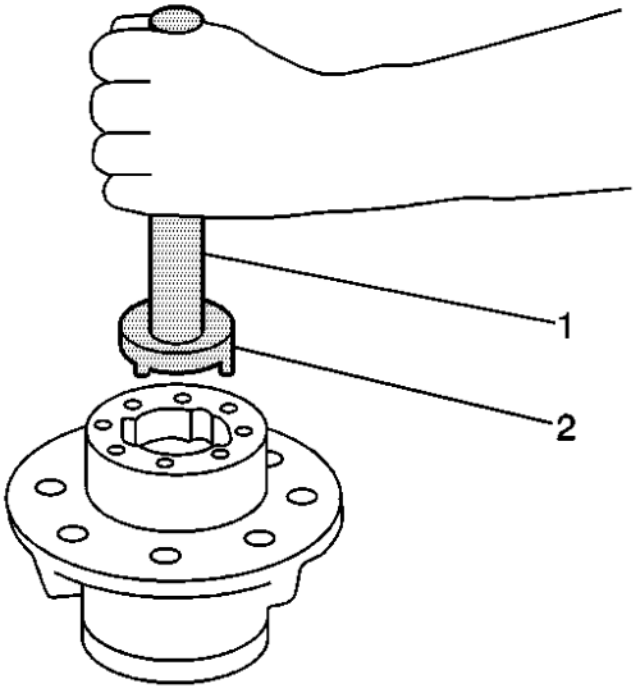


Fig. 83: Outer Hub Bearing & Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the outer bearing assembly rotates freely in the hub**

5. Using the **DT 50291** installer (2) and the **J 8092** handle (1), turn the wheel hub over and seat the outer bearing assembly against the retaining ring.

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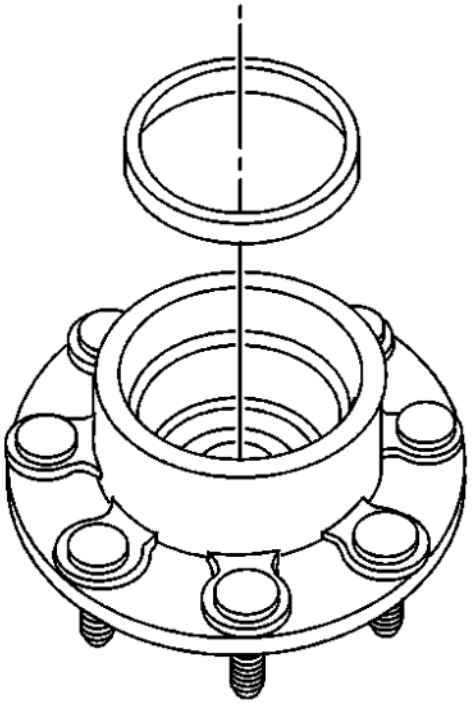


Fig. 84: Wheel Hub Inner Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

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

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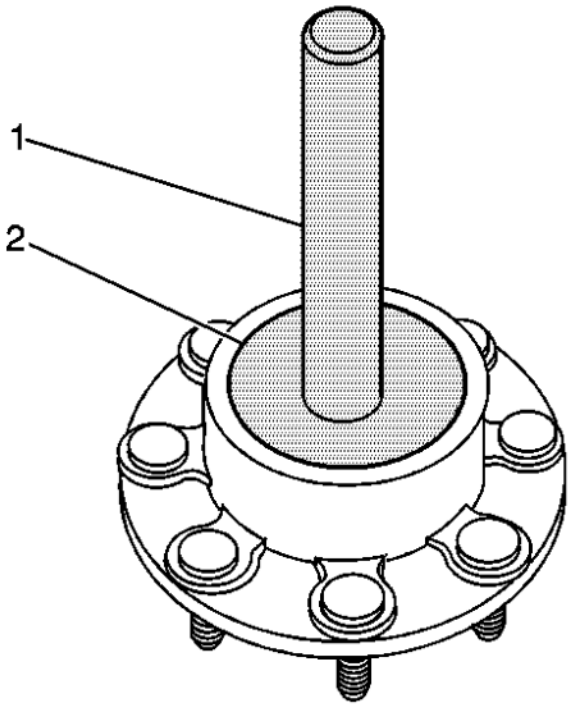


Fig. 85: Driving Inner Bearing Cup Into Wheel Hub
Courtesy of GENERAL MOTORS COMPANY

7. Using the **DT 50292** installer (2) and the **J 8092** handle (1), install the inner bearing cup into the wheel hub.

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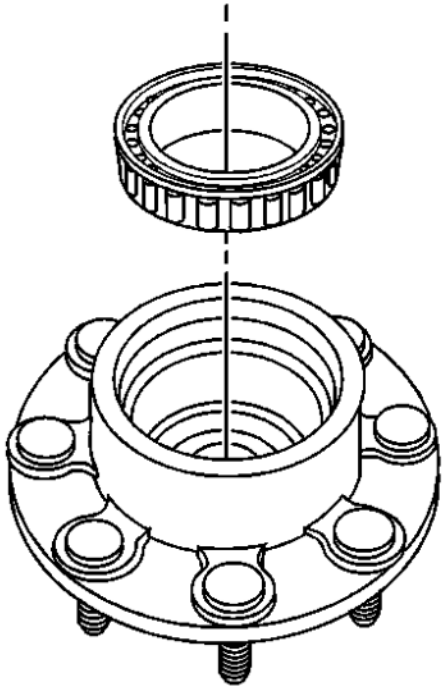


Fig. 86: Inner Hub Bearing
Courtesy of GENERAL MOTORS COMPANY

8. Install the inner bearing.

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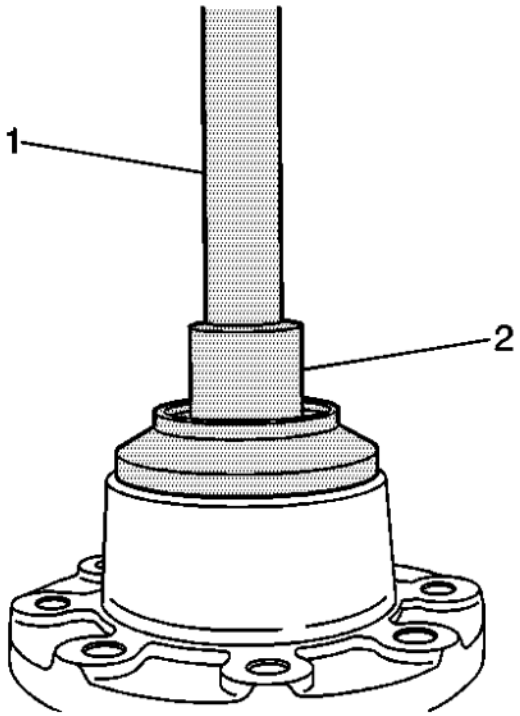


Fig. 87: Installing Oil Seal Using Special Tools
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure the seal is fully seated in the hub bore.**

9. Using the **DT 50289** installer (2) and the **J 8092** handle (1), install the new oil seal.
10. Install the rotor, if necessary. Refer to **Rear Brake Rotor Replacement (JD9)** **Rear Brake Rotor Replacement (J95)** .
11. Apply a light coat of high melting point EP bearing lubricant to the axle housing spindle.

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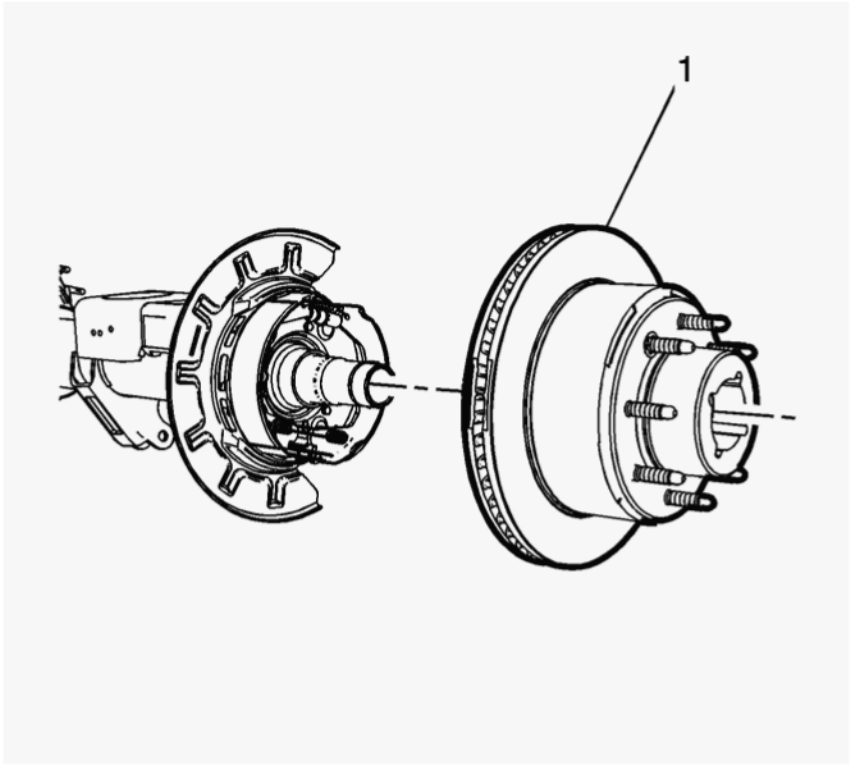


Fig. 88: Wheel Hub/Brake Rotor Assembly
Courtesy of GENERAL MOTORS COMPANY

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

12. Install the wheel hub assembly on the axle housing.

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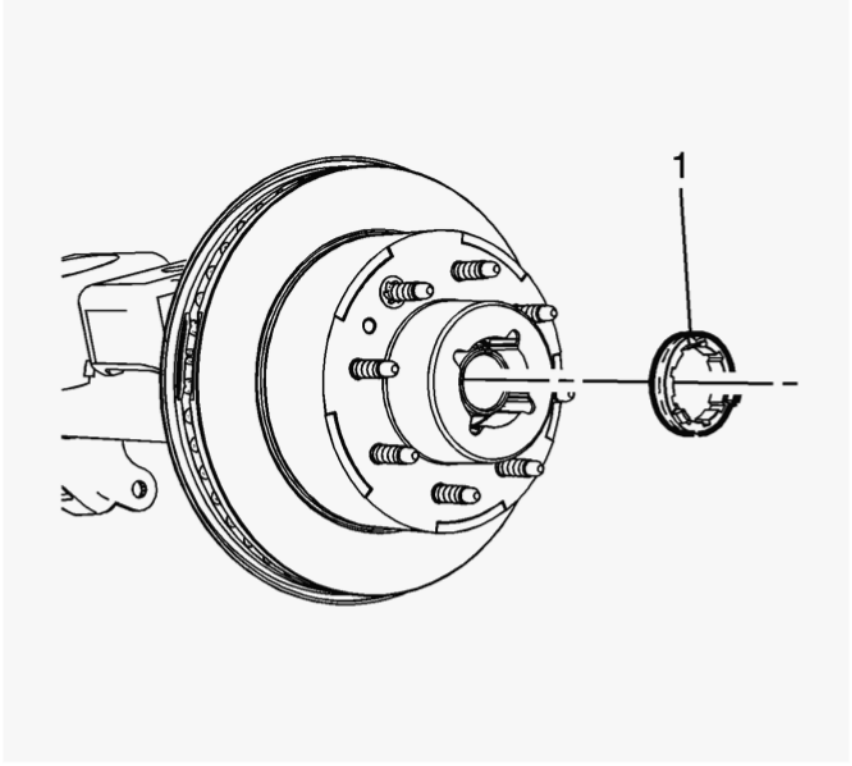


Fig. 89: Rear Axle Adjuster Nut
Courtesy of GENERAL MOTORS COMPANY

13. Install the rear axle adjuster nut (1).

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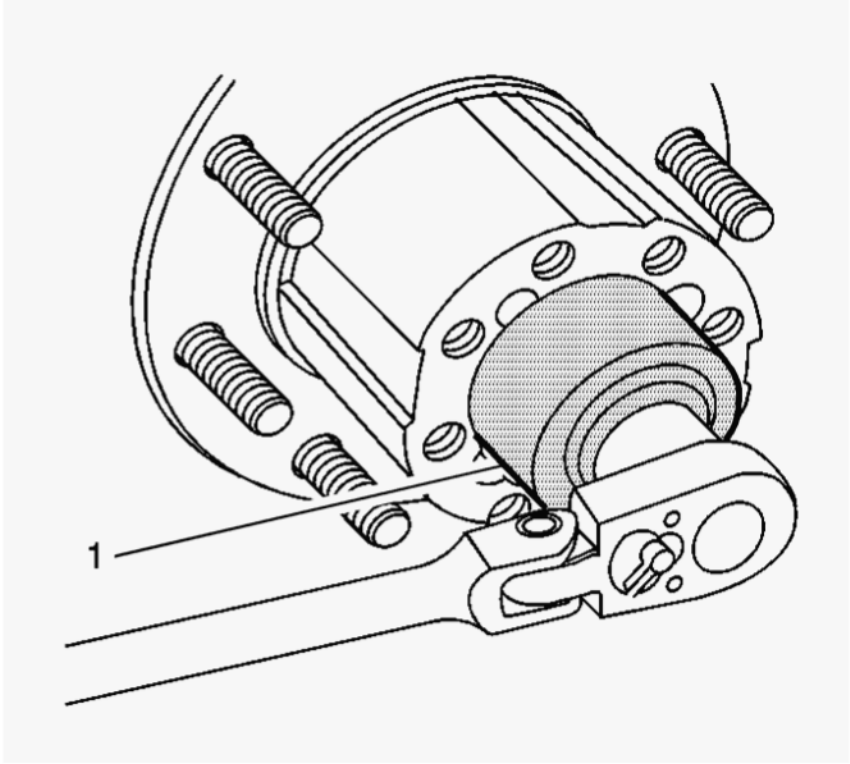


Fig. 90: Adjusting Nut And Special Tool
Courtesy of GENERAL MOTORS COMPANY

14. Using the **CH 49794** socket or the **CH 50636** socket (1), install the adjusting nut to the hub.
15. Adjust the wheel bearings. Refer to **Wheel Bearing Adjustment (10.5 Inch Axle)**.

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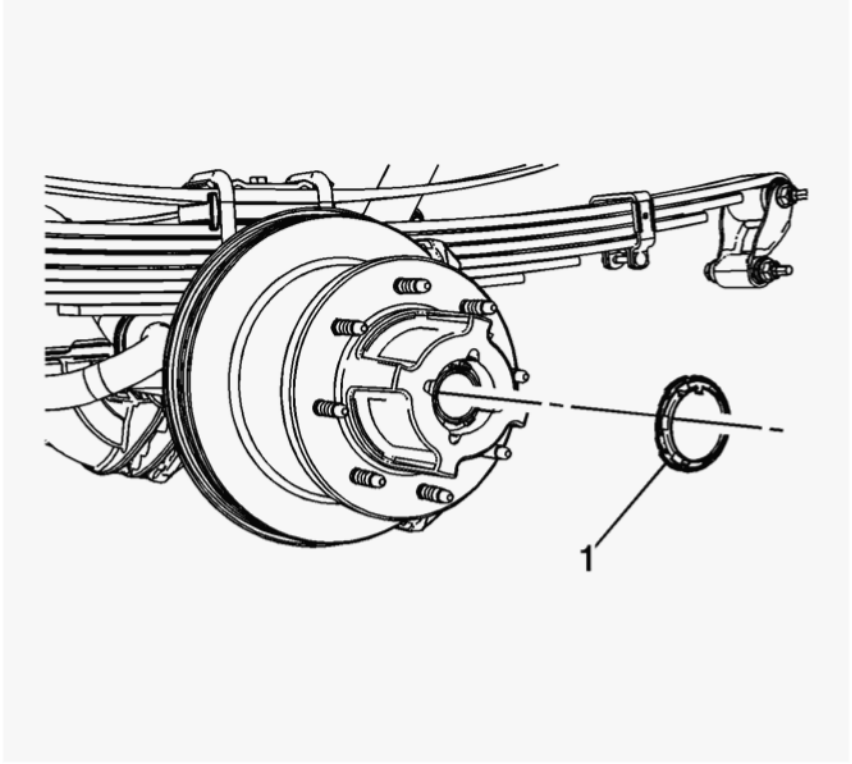


Fig. 91: Adjuster Nut Retainer
Courtesy of GENERAL MOTORS COMPANY

16. Install the adjuster nut retainer (1).
17. Install the axle shaft. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**.
18. Install the brake caliper bracket. Refer to **Rear Brake Caliper Bracket Replacement (JD9)** **Rear Brake Caliper Bracket Replacement (J95)** .
19. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .
20. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
21. Lower the vehicle.

REAR WHEEL INNER AND OUTER BEARING REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **CH 49794** Axle Hub Nut Socket
- **CH-50636** Axle Hub Nut Socket
- **DT 50289** Differential Bearing and Hub Seal Installer
- **DT 50290** Wheel Bearing Installer Outer Bearing Cup
- **DT 50291** Wheel Bearing Race Installer - Outer
- **DT 50292** Wheel Bearing Race Installer - Inner
- **J 8092** Universal Driver Handle-3/4 x 10 inch

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

Removal Procedure

NOTE:

- **The wheel speed sensor ring is NOT serviced separately. The hub and wheel speed senor ring are serviced as an assembly.**
- **The wheel hub seal must be replaced anytime the wheel hub assembly is removed from the axle housing.**

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .

NOTE: **In the following service procedure, it is not necessary to remove the brake caliper from the bracket.**

3. Remove the brake caliper bracket. Refer to **Rear Brake Caliper Bracket Replacement (JD9)** **Rear Brake Caliper Bracket Replacement (J95)** .
4. Remove the axle shaft. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**.

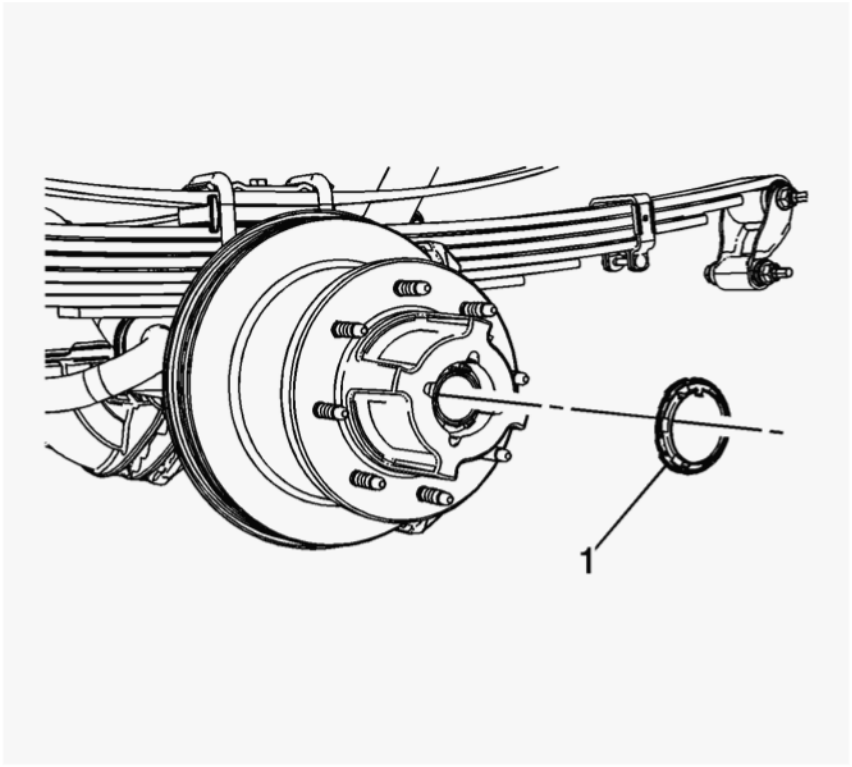


Fig. 92: Adjuster Nut Retainer
Courtesy of GENERAL MOTORS COMPANY

5. Remove the adjuster nut retainer (1).

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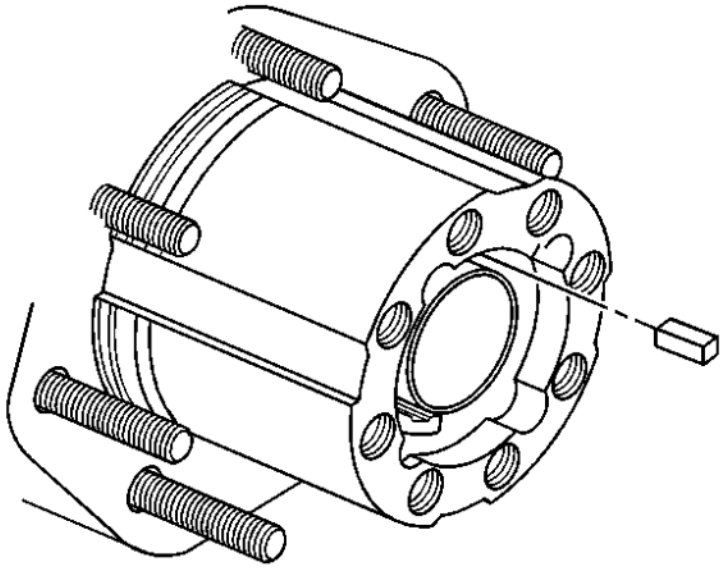


Fig. 93: Removing Key
Courtesy of GENERAL MOTORS COMPANY

6. Remove the key.

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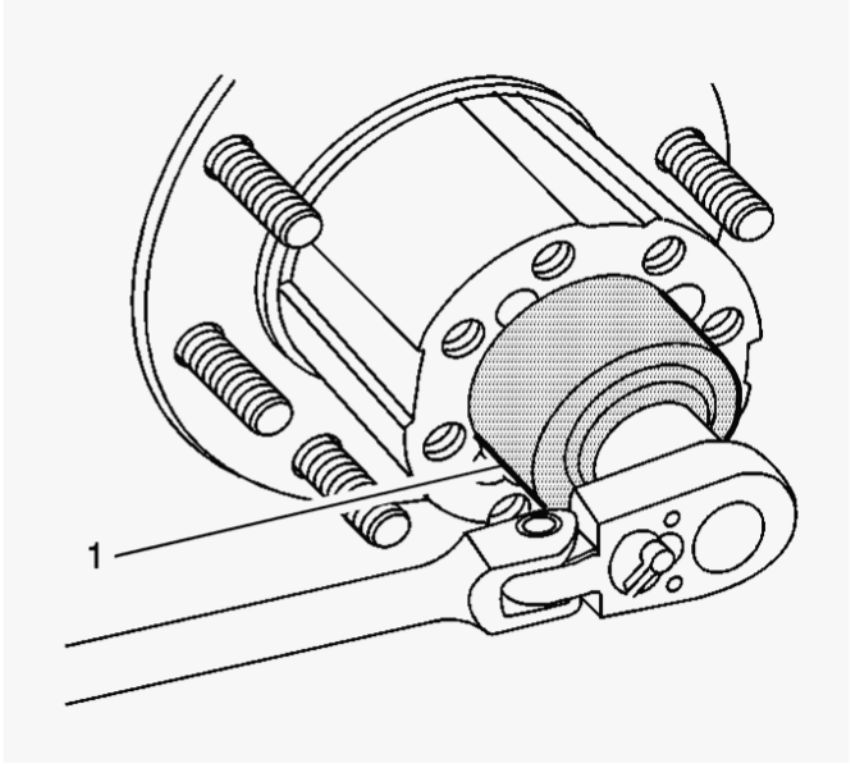


Fig. 94: Adjusting Nut And Special Tool
Courtesy of GENERAL MOTORS COMPANY

7. Using the **CH 49794** socket or the **CH 50636** socket (1), loosen the adjusting nut.

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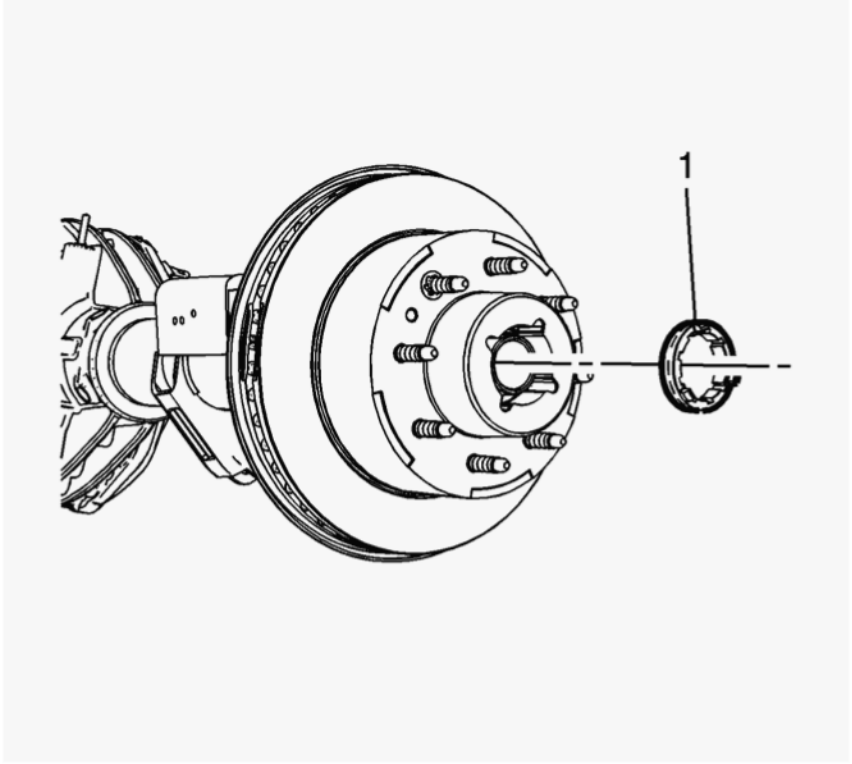


Fig. 95: Adjuster Nut
Courtesy of GENERAL MOTORS COMPANY

8. Remove the adjusting nut.

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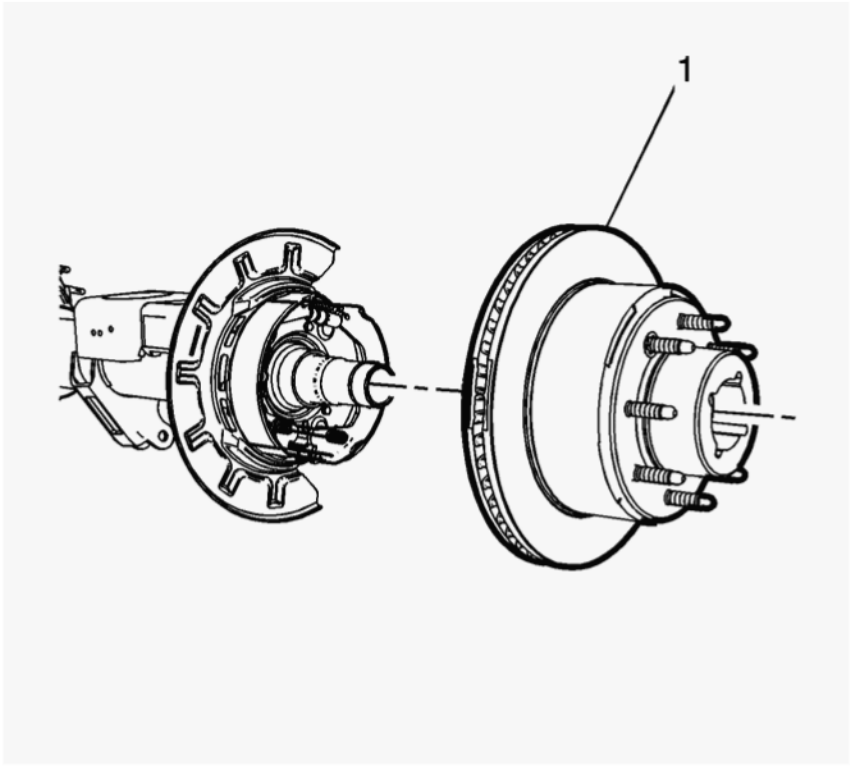


Fig. 96: Wheel Hub/Brake Rotor Assembly
Courtesy of GENERAL MOTORS COMPANY

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

9. Remove the wheel hub/brake rotor assembly (1) from the axle housing.
10. Remove the rotor, if necessary. Refer to Rear Brake Rotor Replacement (JD9) Rear Brake Rotor Replacement (J95) .
11. Using a suitable seal removal tool, remove the oil seal from the wheel hub.

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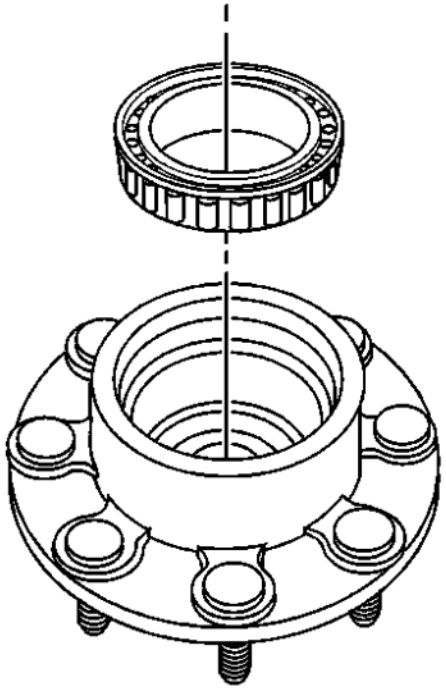


Fig. 97: Inner Hub Bearing
Courtesy of GENERAL MOTORS COMPANY

12. Remove and discard the inner hub bearing.

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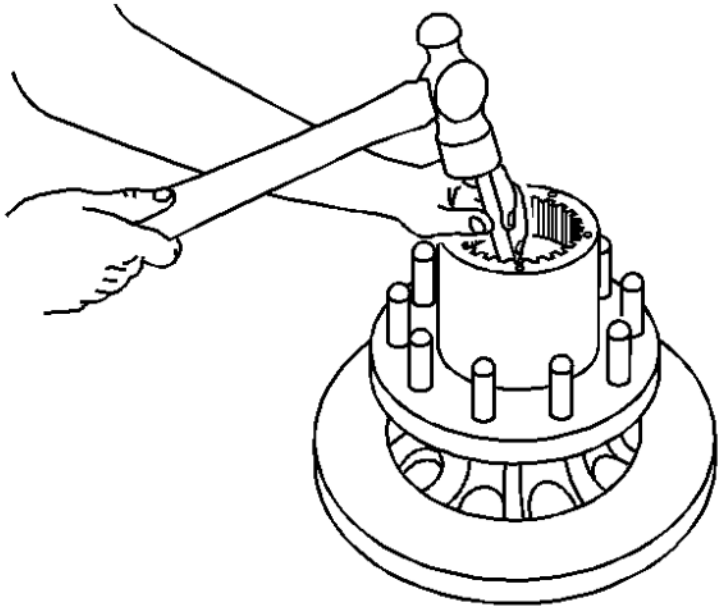


Fig. 98: Removing Inner Hub Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

13. Using a brass drift and a hammer, remove and discard the inner hub bearing cup.

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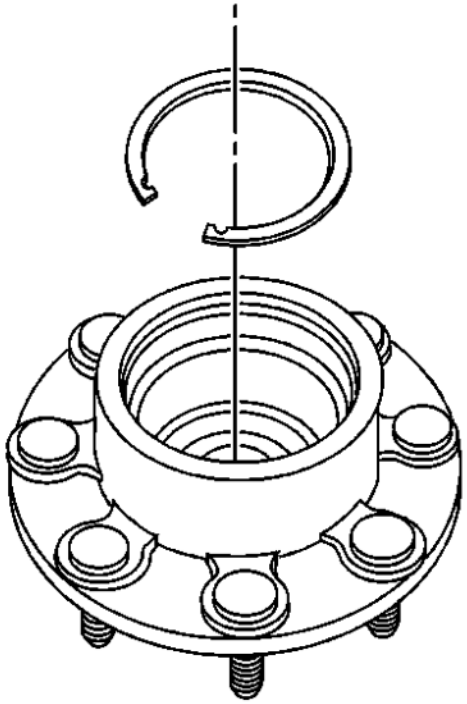


Fig. 99: Wheel Hub Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

14. Remove the retaining ring from the wheel hub.

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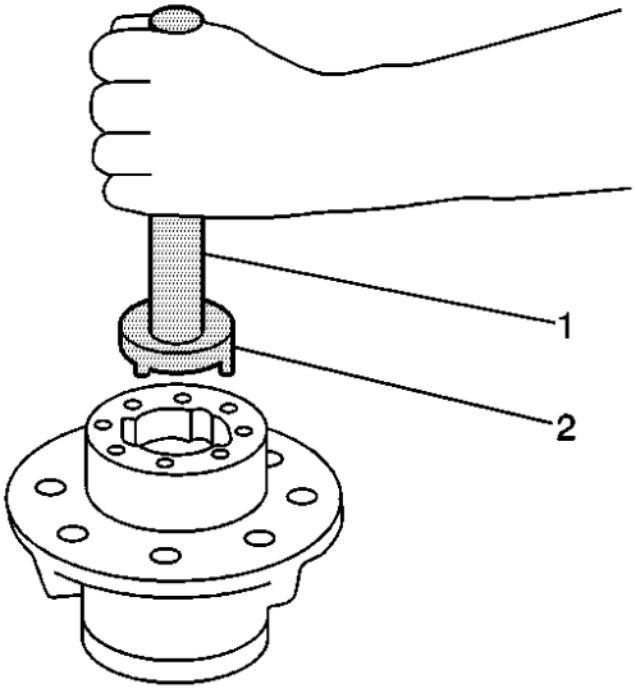


Fig. 100: Outer Hub Bearing & Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

15. Using the **DT 50291** installer (2) and the **J 8092** handle (1), remove and discard the outer hub bearing and bearing cup.

Installation Procedure

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

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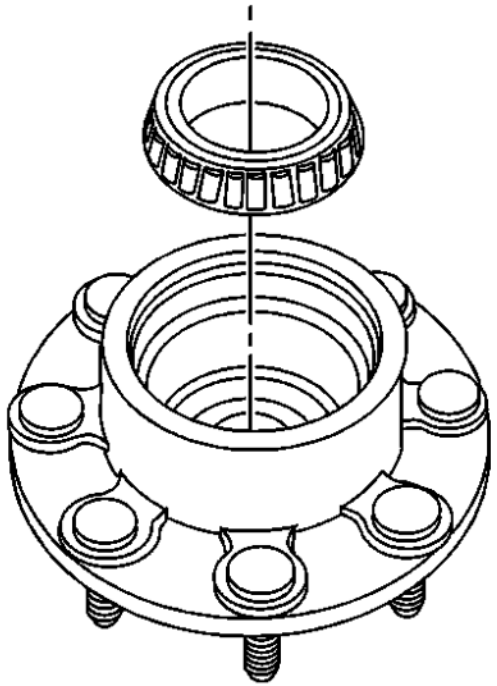


Fig. 101: Wheel Hub Outer Bearing
Courtesy of GENERAL MOTORS COMPANY

2. Install the NEW outer bearing into the wheel hub.

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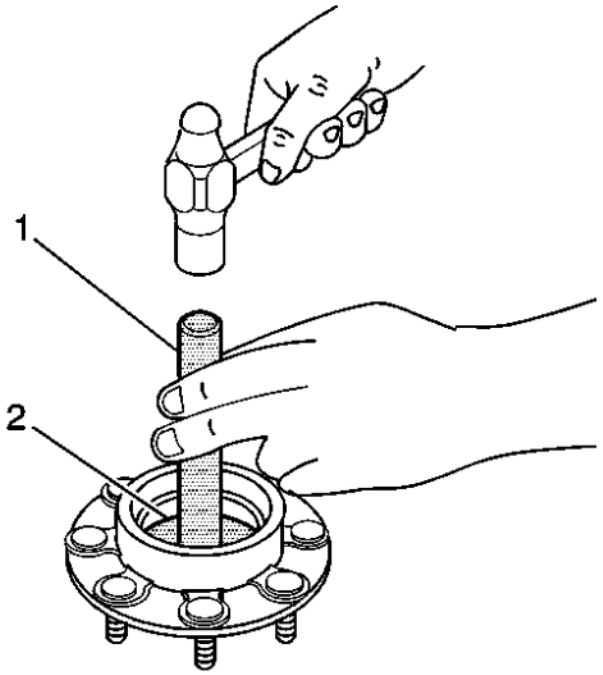


Fig. 102: Driving Bearing Cup Into Wheel Hub
Courtesy of GENERAL MOTORS COMPANY

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

3. Using the **DT 50290** installer (2) and the **J 8092** handle (1), install the NEW outer bearing cup into the wheel hub.

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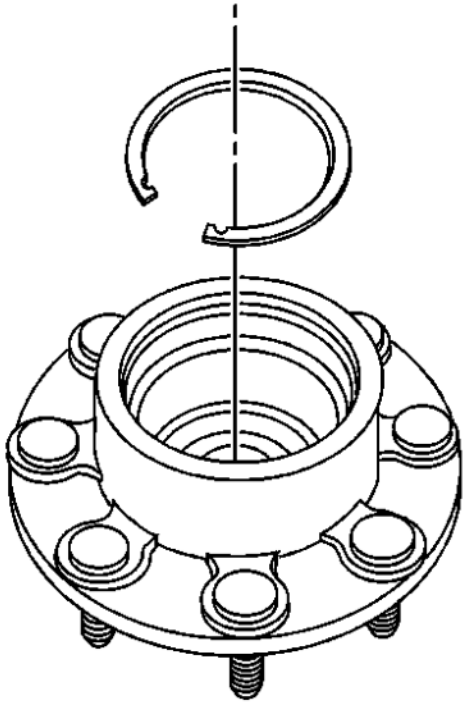


Fig. 103: Wheel Hub Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the retaining ring is fully and evenly seated in the groove.**

4. Install the retaining ring into the groove.

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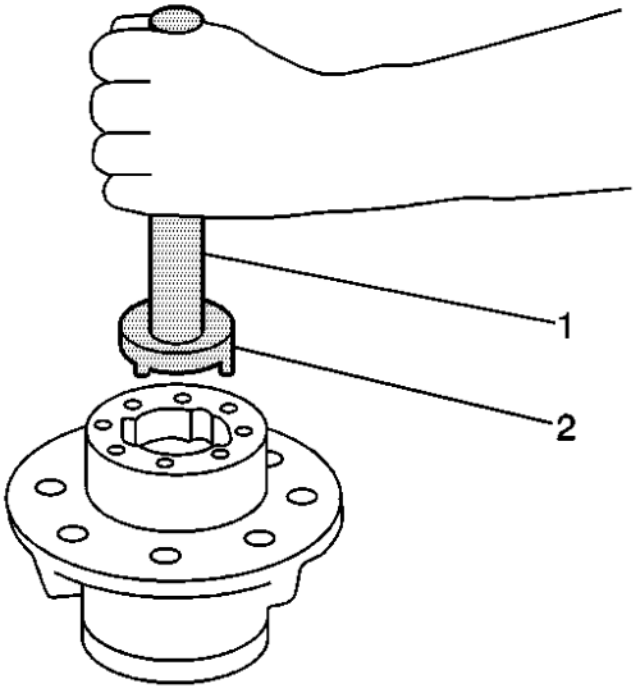


Fig. 104: Outer Hub Bearing & Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure that the outer bearing assembly rotates freely in the hub**

5. Using the **DT 50291** installer (2) and the **J 8092** handle (1), turn the wheel hub over and seat the outer bearing assembly against the retaining ring.

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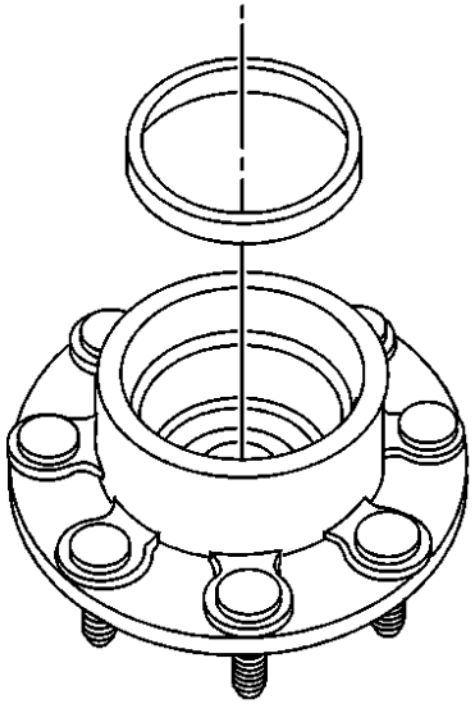


Fig. 105: Wheel Hub Inner Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

6. Turn the wheel hub over and install the NEW inner bearing cup.

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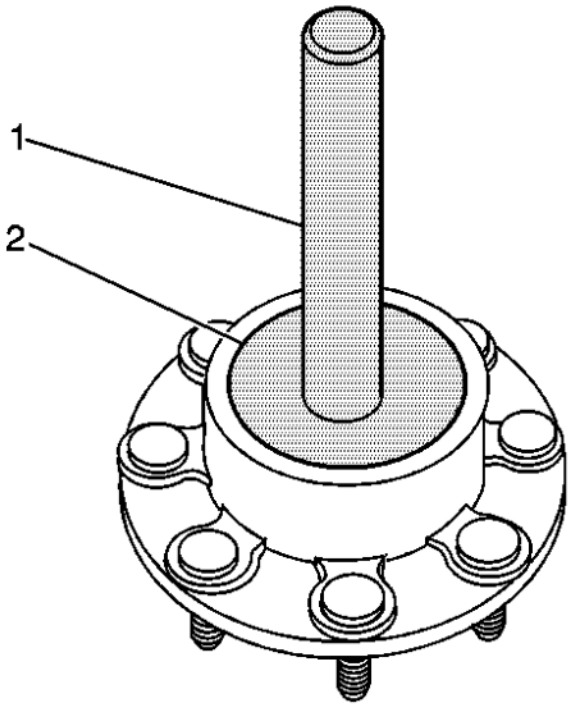


Fig. 106: Driving Inner Bearing Cup Into Wheel Hub
Courtesy of GENERAL MOTORS COMPANY

7. Using the **DT 50292** installer (2) and the **J 8092** handle (1), install the NEW inner bearing cup into the wheel hub.

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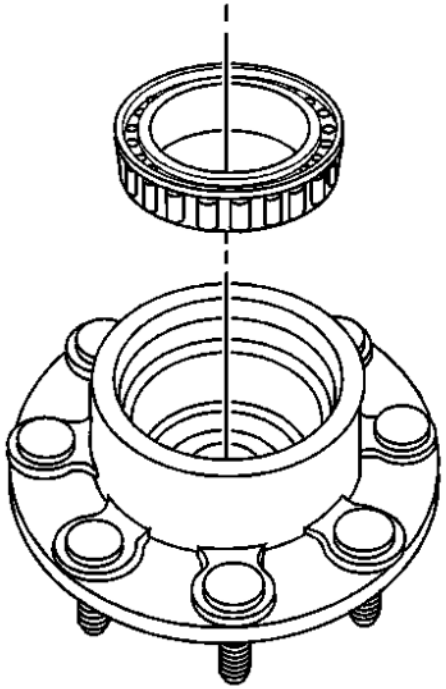


Fig. 107: Inner Hub Bearing
Courtesy of GENERAL MOTORS COMPANY

8. Install the NEW inner bearing.

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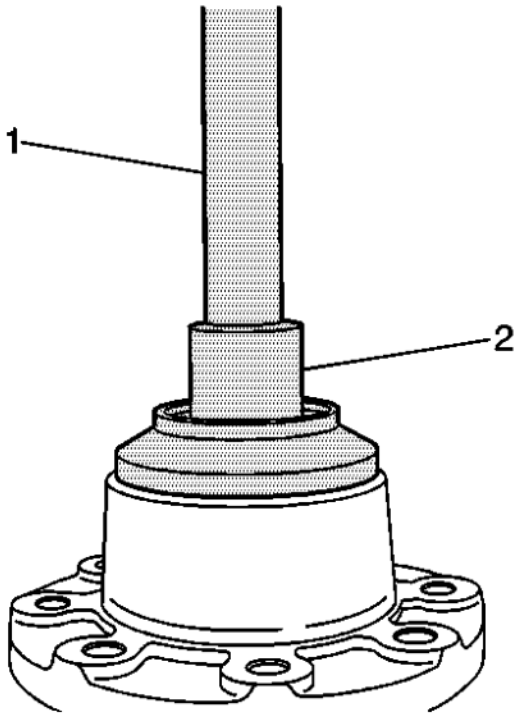


Fig. 108: Installing Oil Seal Using Special Tools
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Ensure the seal is fully seated in the hub bore.**

9. Using the **DT 50289** installer (2) and the **J 8092** handle (1), install the new oil seal.
10. Install the rotor, if necessary. Refer to **Rear Brake Rotor Replacement (JD9)** **Rear Brake Rotor Replacement (J95)** .
11. Apply a light coat of high melting point EP bearing lubricant to the axle housing spindle.

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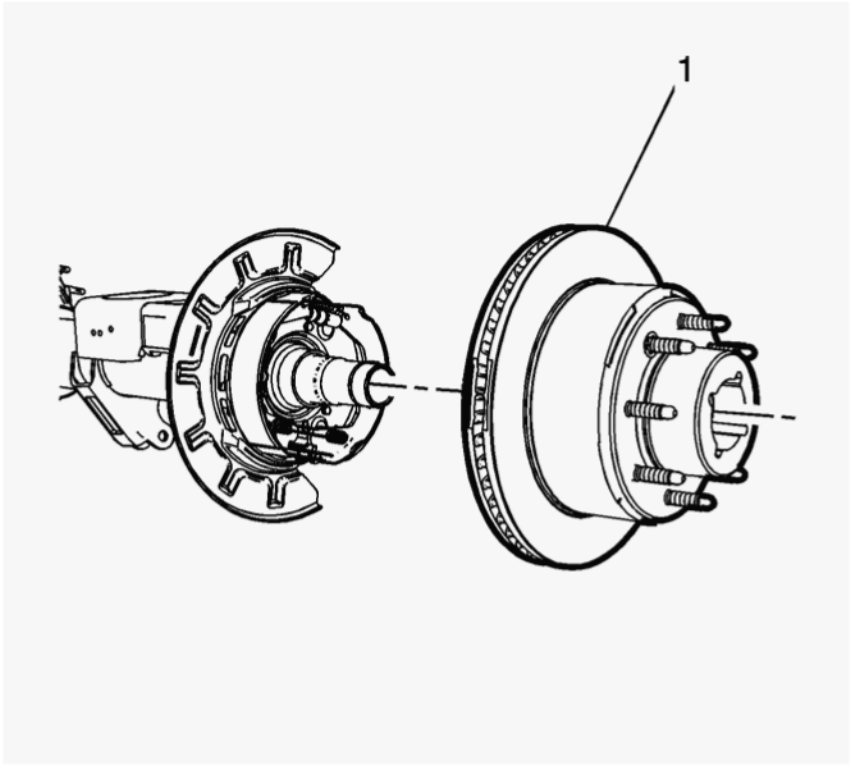


Fig. 109: Wheel Hub/Brake Rotor Assembly
Courtesy of GENERAL MOTORS COMPANY

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

12. Install the wheel hub assembly on the axle housing.

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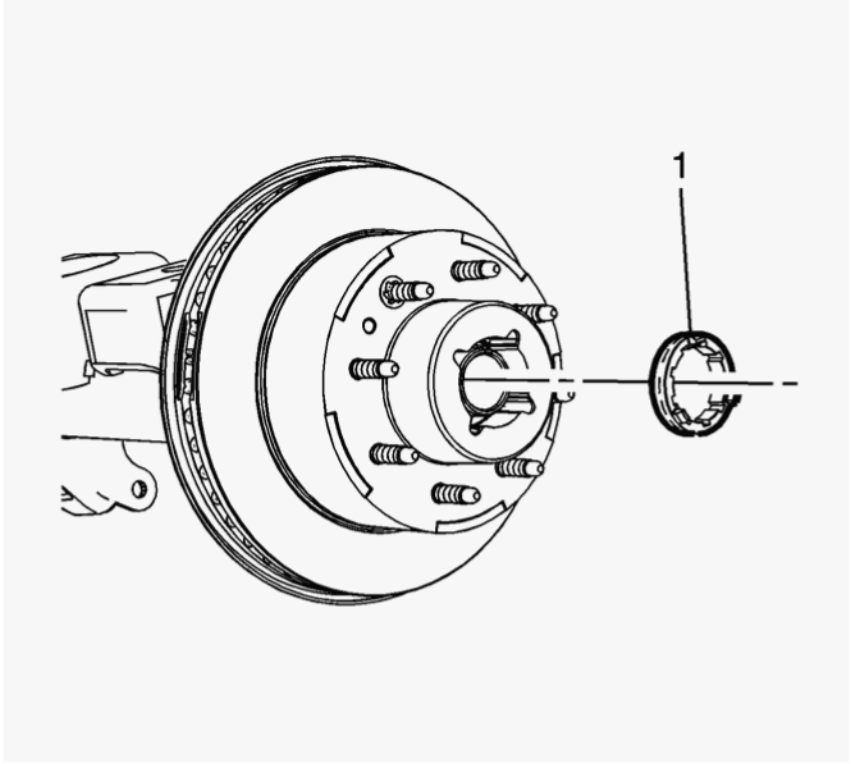


Fig. 110: Rear Axle Adjuster Nut
Courtesy of GENERAL MOTORS COMPANY

13. Install the rear axle adjuster nut (1).

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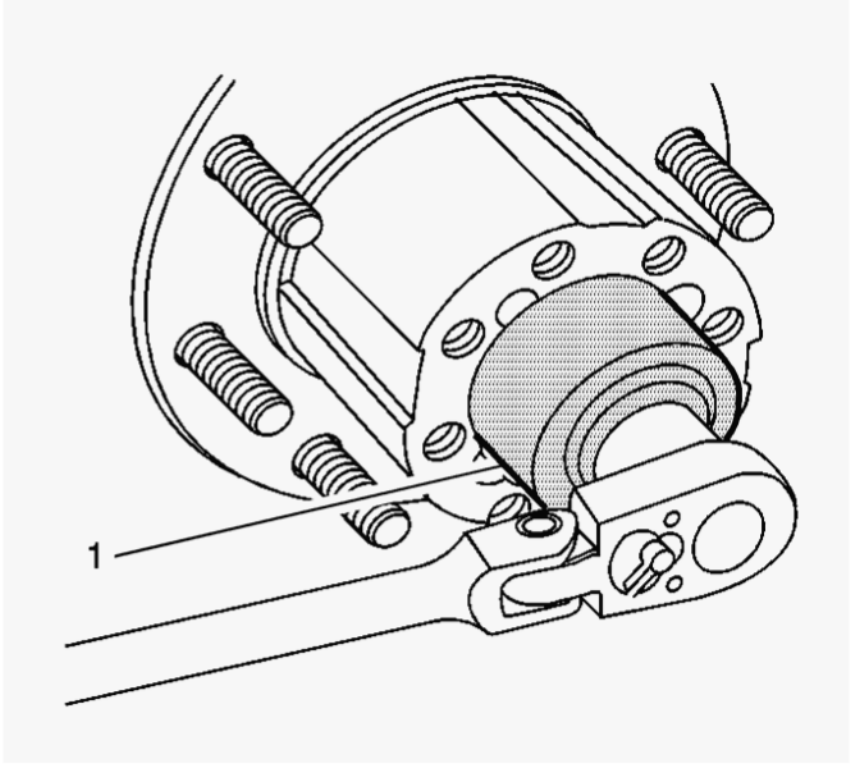


Fig. 111: Adjusting Nut And Special Tool
Courtesy of GENERAL MOTORS COMPANY

14. Using the **CH 49794** socket or the **CH 50636** socket (1), install the adjusting nut to the hub.
15. Adjust the wheel bearings. Refer to **Wheel Bearing Adjustment (10.5 Inch Axle)**.

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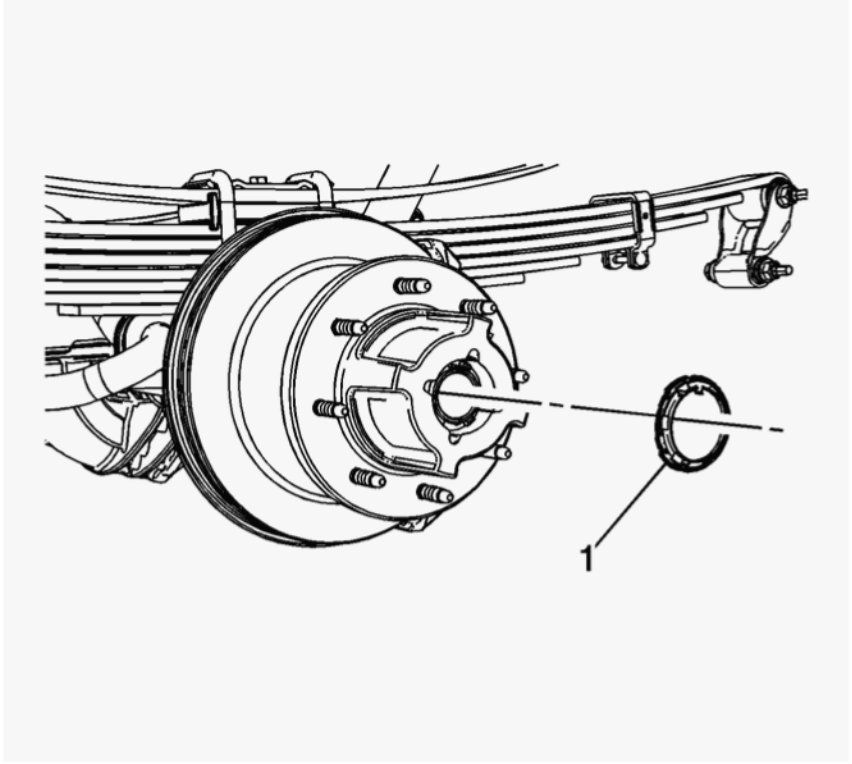


Fig. 112: Adjuster Nut Retainer
Courtesy of GENERAL MOTORS COMPANY

16. Install the adjuster nut retainer (1).
17. Install the axle shaft. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**.
18. Install the brake caliper bracket. Refer to **Rear Brake Caliper Bracket Replacement (JD9)** **Rear Brake Caliper Bracket Replacement (J95)** .
19. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .
20. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
21. Lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR BEARING RETAINER REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **GE-8092** Driver Handle
- **J-8092** Universal Driver Handle 3/4 x 10 inch
- **J-8608** Pinion Bearing Cup Installer
- **J-24433** Pinion Bearing Installer
- **J-37624** Pinion Bearing Installer
- **J 3/4 44414** Pinion Oil Seal Installer

Removal Procedure

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NOTE: **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 and support the vehicle. Refer to **Lifting and Jacking the Vehicle**
2. Drain the axle lubricant. Refer to **Differential Oil Replacement (10.5 Inch Axle)**
3. Remove the rear axle shafts. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**
4. Remove the rear propeller shaft. Refer to **Rear Propeller Shaft Replacement (Heavy Duty)** **Rear Propeller Shaft Replacement (M5U, 2WD)**
5. Remove the drive pinion flange/yoke and/or oil seal. Refer to **Differential Drive Pinion Gear Yoke Replacement (10.5 Inch Axle)**, **Differential Drive Pinion Gear Seal Replacement (10.5 Inch Axle)**

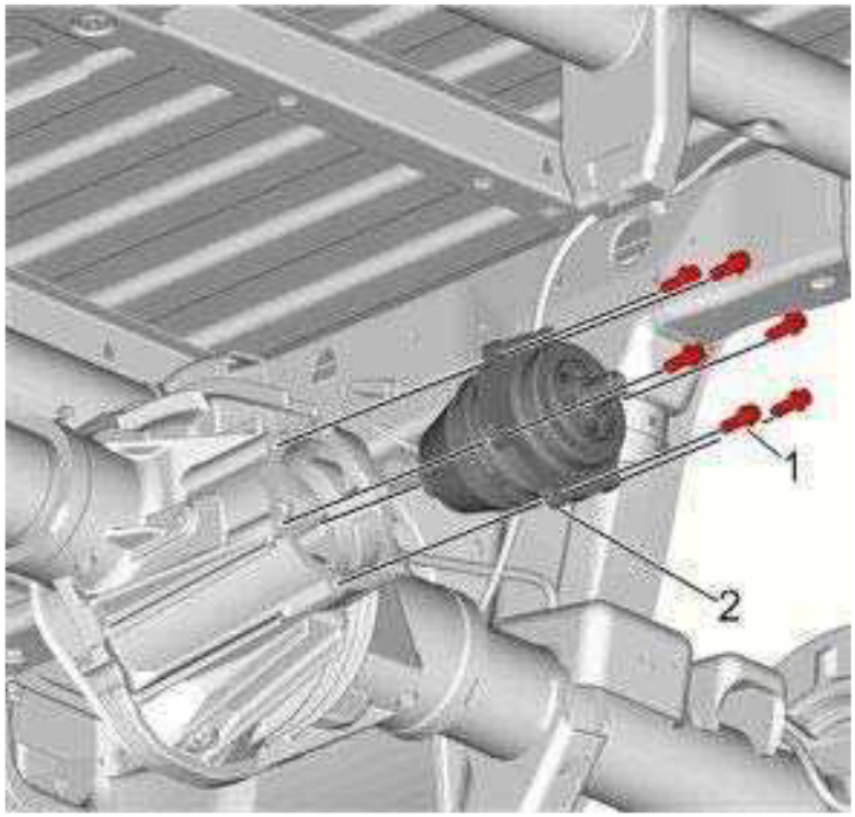


Fig. 113: Differential Drive Pinion Gear Bearing Retainer Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Remove the differential drive pinion gear bearing retainer bolts (1) and the differential drive pinion gear bearing retainer (2).

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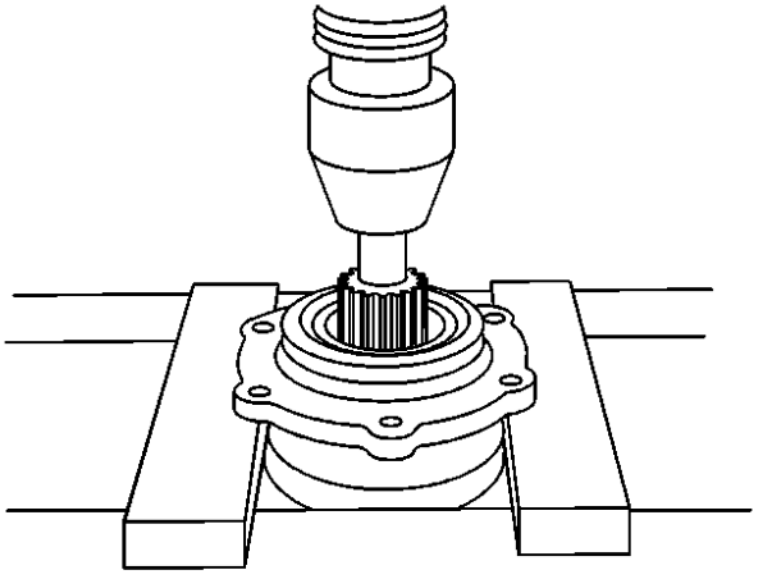


Fig. 114: Removing Pinion
Courtesy of GENERAL MOTORS COMPANY

7. Using a hydraulic press and an appropriate tool, remove the pinion.

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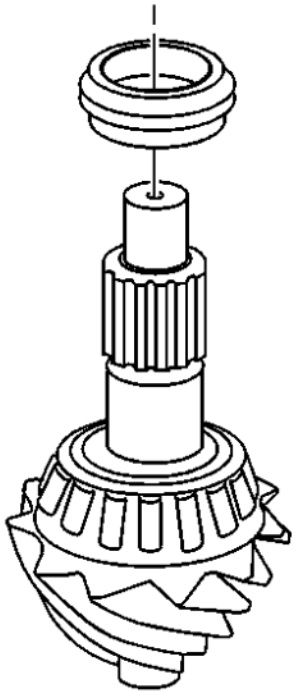


Fig. 115: Removing Collapsible Spacer
Courtesy of GENERAL MOTORS COMPANY

8. Remove the collapsible spacer.

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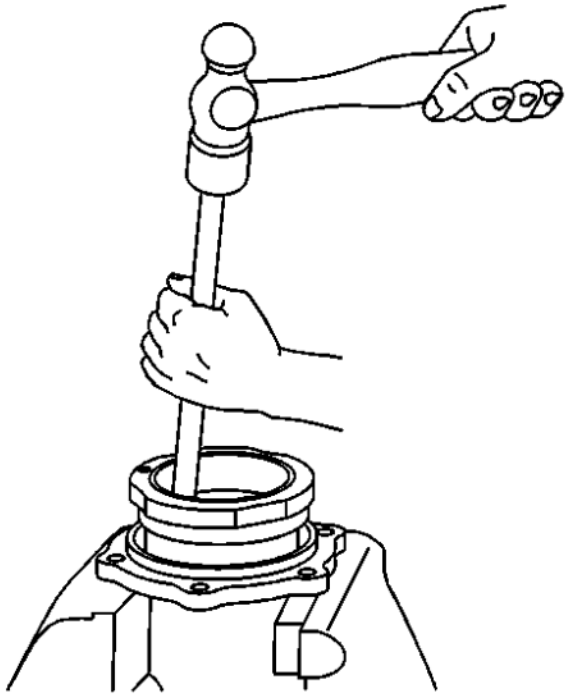


Fig. 116: Removing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE: **When performing the following service procedure, move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.**

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

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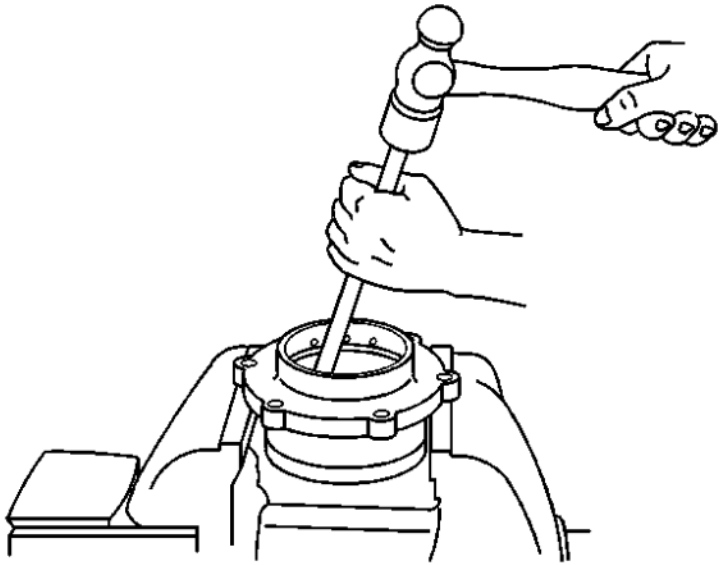


Fig. 117: Removing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE: **When performing the following service procedure, move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.**

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

Installation Procedure

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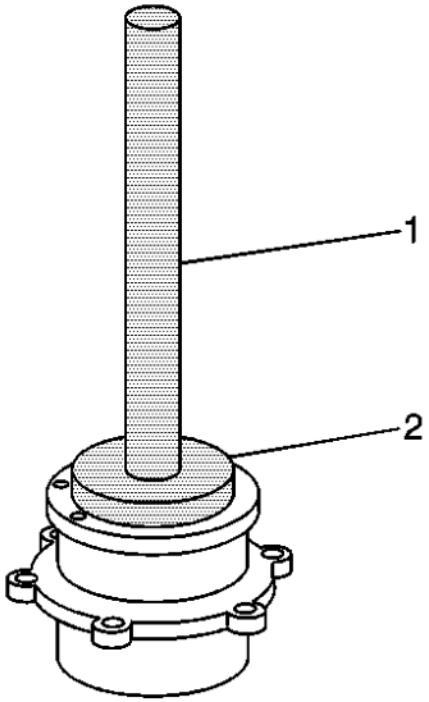


Fig. 118: Installing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

1. Using the **J-37624** pinion bearing installer (2) and the **GE-8092** driver handle (1), Install the inner pinion bearing cup into the pinion gear bearing retainer.

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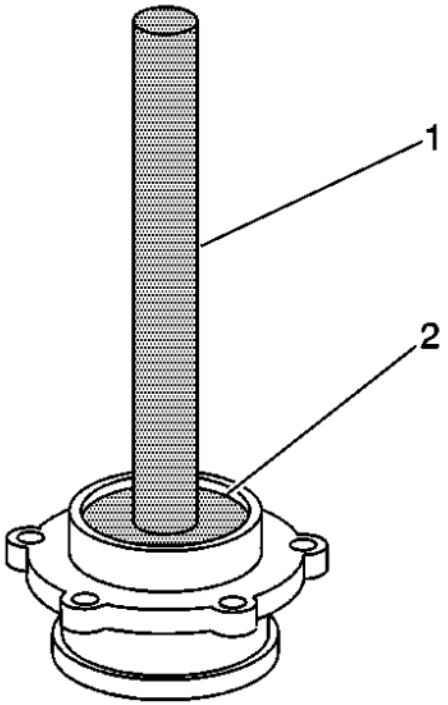


Fig. 119: Installing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

2. Using the **J-8608** pinion bearing cup installer (2) and the **GE-8092** driver handle (1), install the outer pinion bearing cup into the pinion gear bearing retainer.
3. Apply sealant to surface of the selective shim. Refer to **Adhesives, Fluids, Lubricants, and Sealers**

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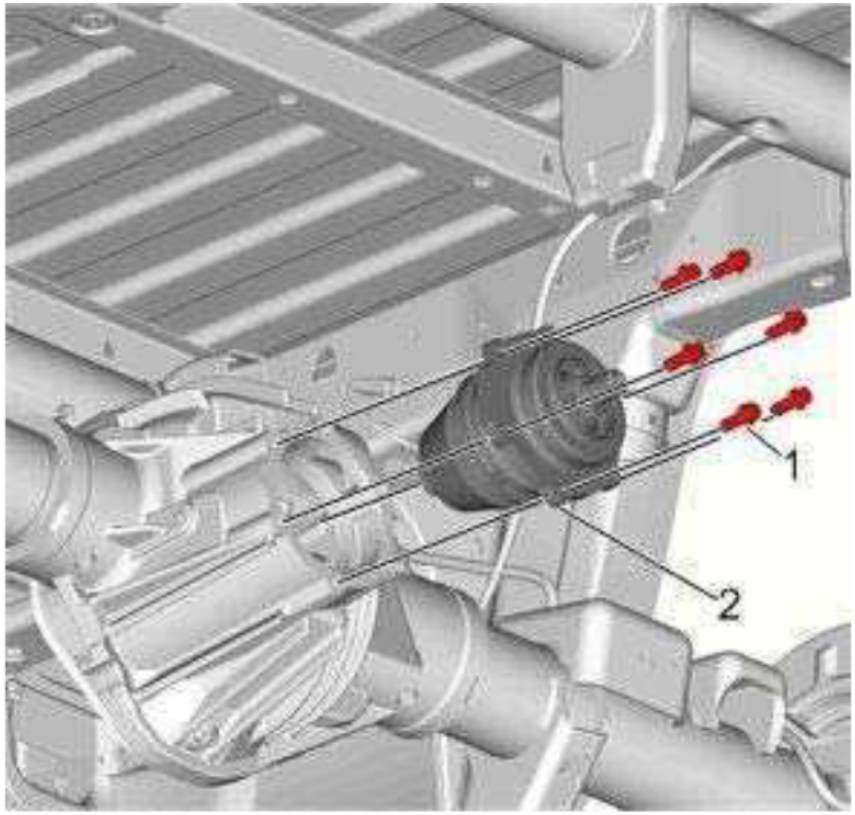


Fig. 120: Differential Drive Pinion Gear Bearing Retainer Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Install the differential drive pinion gear bearing retainer (2) and the differential drive pinion gear bearing retainer bolts (1).

CAUTION: **Refer to Fastener Caution .**

5. Tighten the differential drive pinion gear bearing retainer bolts (1) to 88 N.m (65 lb ft).
6. Install the drive pinion flange/yoke and/or oil seal. Refer to **Differential Drive Pinion Gear Yoke Replacement (10.5 Inch Axle)**, **Differential Drive Pinion Gear Seal Replacement (10.5 Inch Axle)**
7. Install the propeller shaft. Refer to **Rear Propeller Shaft Replacement (Heavy Duty)** **Rear Propeller Shaft Replacement (M5U, 2WD)**
8. Install the rear axle shafts. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**
9. Fill the axle with axle lubricant. Refer to **Differential Oil Replacement (10.5 Inch Axle)**
10. Remove the support and lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT (8.6/9.5/9.76 INCH AXLE)

Special Tools

J-22536 Pinion Remover

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

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Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential case assembly. Refer to **Differential Replacement (8.6/9.5/9.76 Inch Axles)**.
3. Remove the differential pinion yoke and the oil seal. Refer to **Differential Drive Pinion Gear Yoke Replacement (8.6/9.5/9.76 Inch Axles)**, and **Differential Drive Pinion Gear Seal Replacement (8.6/9.5/9.76 Inch Axles)**.

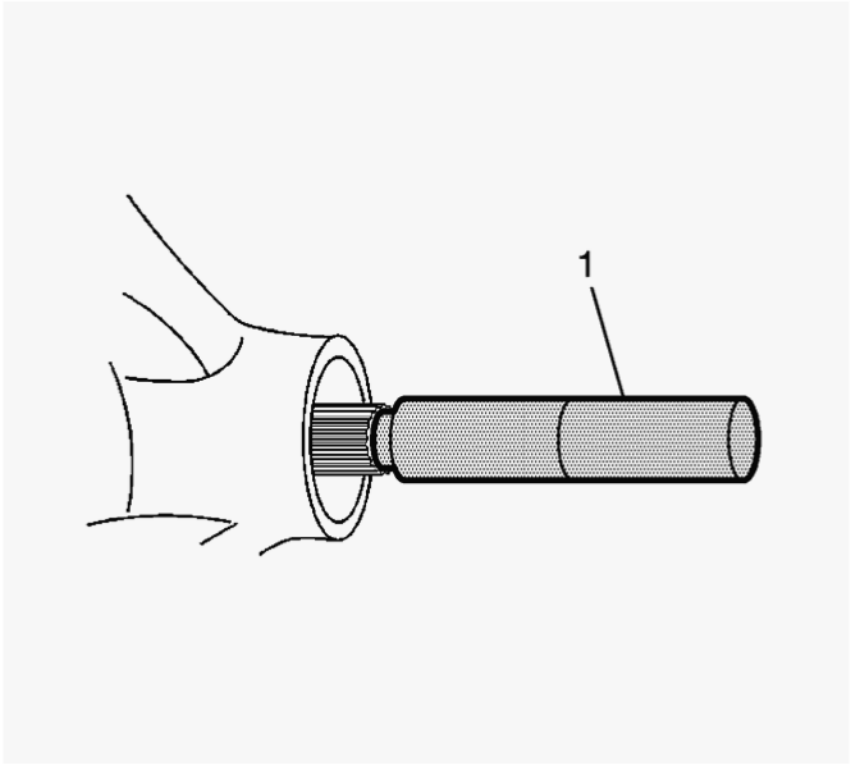


Fig. 121: Special Tool On Pinion
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **Ensure that the J-22536 remover is firmly seated on the differential pinion gear for 8.6 inch axle.**
- **When removing the differential pinion gear, DO NOT let the differential pinion gear fall out of the axle housing.**
- **Use brass drift only and hammer when removing differential pinion gear from the 9.5/9.76 axle**

4. Using the **J-22536** remover for the 8.6 inch axle, or a brass drift and hammer for 9.5/9.76 axle, remove the differential pinion gear from the axle housing.

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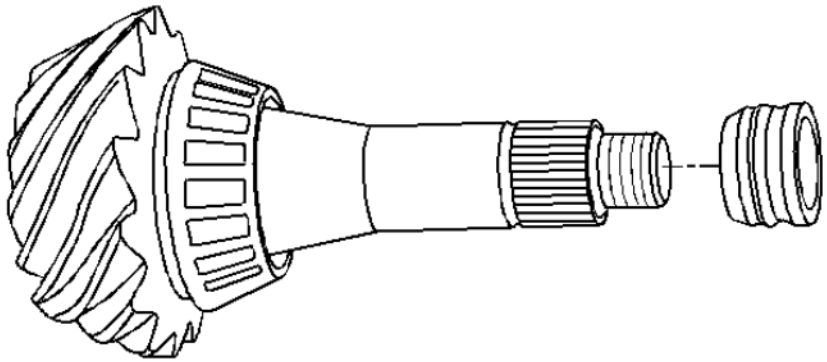


Fig. 122: Collapsible Spacer And Pinion
Courtesy of GENERAL MOTORS COMPANY

5. Remove and discard the collapsible spacer from the pinion.
6. Remove the differential pinion bearings and the cups. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.

NOTE: **The differential ring gear bolts have left-hand threads.**

7. Remove and discard the differential gear bolts. Replace with NEW only.

CAUTION: **Refer to Ring Gear Removal Caution .**

NOTE: **It maybe necessary to use a brass drift and a hammer to remove the differential ring gear from the differential case.**

8. Remove the differential ring gear from the differential case.

Installation Procedure

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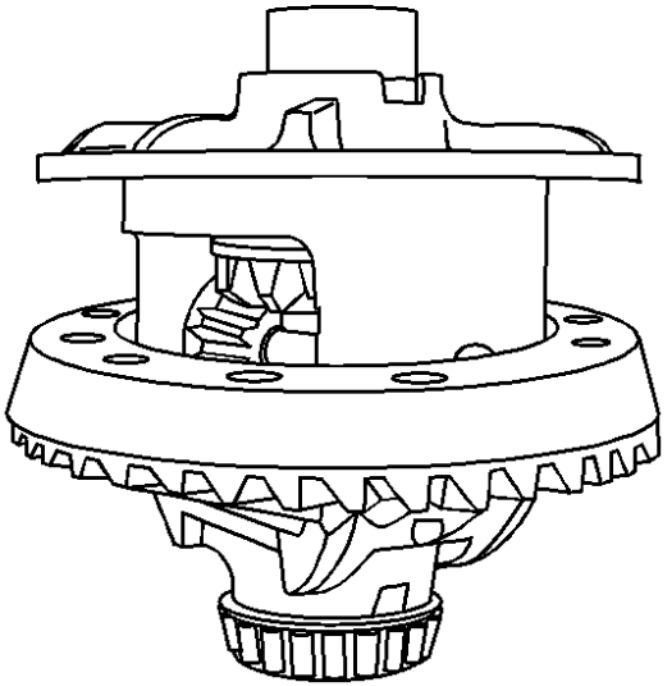


Fig. 123: Ring Gear And Differential Case
Courtesy of GENERAL MOTORS COMPANY

NOTE: **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 differential ring gear to the differential case.

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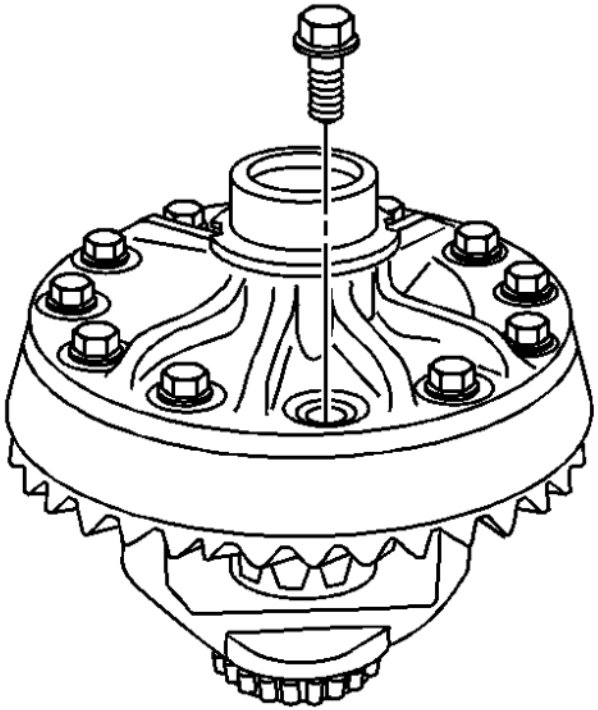


Fig. 124: Ring Gear Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to **Fastener Caution** .

NOTE:

- **The differential ring gear bolts have left-hand threads.**
- **Hand start each bolt to ensure that the ring gear is properly installed to the differential case.**
- **Tighten the differential ring gear bolts alternately and in stages, gradually pulling the ring gear onto the differential case.**

2. Install the NEW differential ring gear bolts and tighten in sequence to 120 N.m (89 lb ft). for the 8.6 inch axle and 50 N.m (37 lb ft) + 30 degrees for 9.5/9.76 inch axles.
3. Install the pinion bearing cups. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.
4. Determine and install the selective shim thickness for the pinion gear. Refer to **Pinion Depth Adjustment (8.6 Inch Axle)Pinion Depth Adjustment (9.5 Inch Axle)Pinion Depth Adjustment (9.76 Inch Axle)**.
5. Install the inner pinion bearing to the pinion. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.
6. Install a new collapsible spacer.
7. Lubricate the pinion bearings with axle lubricant. Refer to **Fluid and Lubricant Recommendations** .
8. Install the outer differential pinion bearing, the NEW differential pinion oil seal and the differential yoke into the axle housing. Refer to **Differential Drive Pinion Gear Yoke Replacement (8.6/9.5/9.76 Inch Axles)**, and **Differential Drive Pinion Gear Seal Replacement (8.6/9.5/9.76 Inch Axles)**.
9. Install the differential case assembly. Refer to **Differential Replacement (8.6/9.5/9.76 Inch Axles)**.
10. Fill the axle with lubricant. Use the proper fluid. Refer to **Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)**.

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11. Remove the support and lower the vehicle.

DRIVE PINION AND RING GEAR REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential case assembly. Refer to **Differential Replacement (10.5 Inch Axle)**.
3. Remove the drive pinion housing assembly. Refer to **Differential Drive Pinion Gear Bearing Retainer Replacement (10.5 Inch Axle)**.

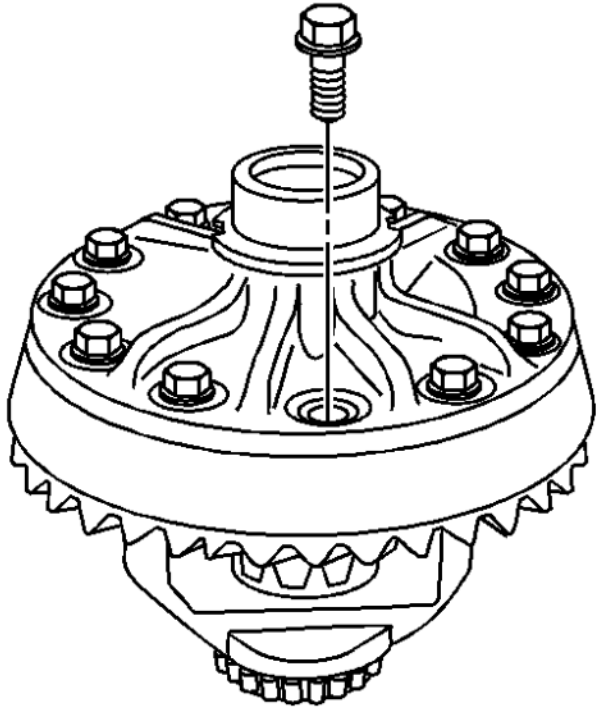


Fig. 125: Ring Gear Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Remove and discard the gear bolts. Replace with NEW only.

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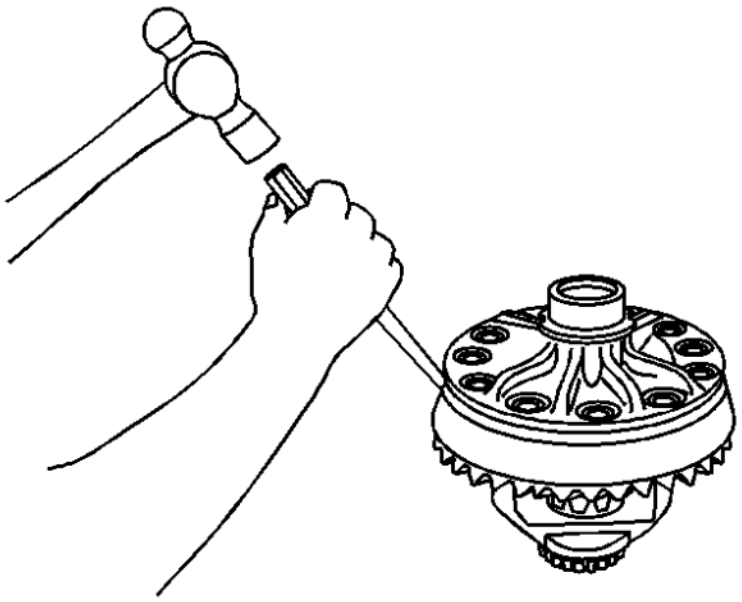


Fig. 126: Removing Ring Gear From Differential
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Ring Gear Removal Caution .

5. Using a brass drift and a hammer, remove the ring gear from the differential case.

Installation Procedure

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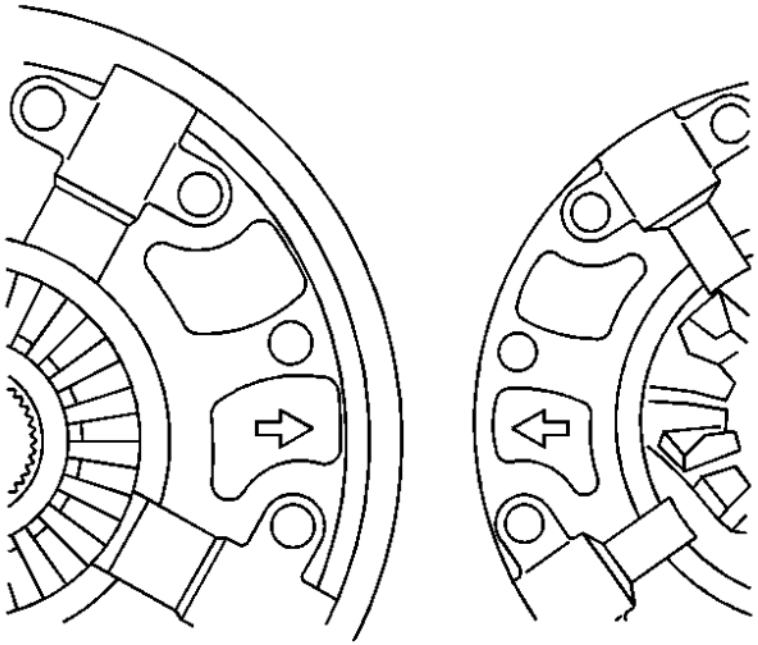


Fig. 127: Aligning Differential Case Arrows
Courtesy of GENERAL MOTORS COMPANY

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

NOTE: **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.

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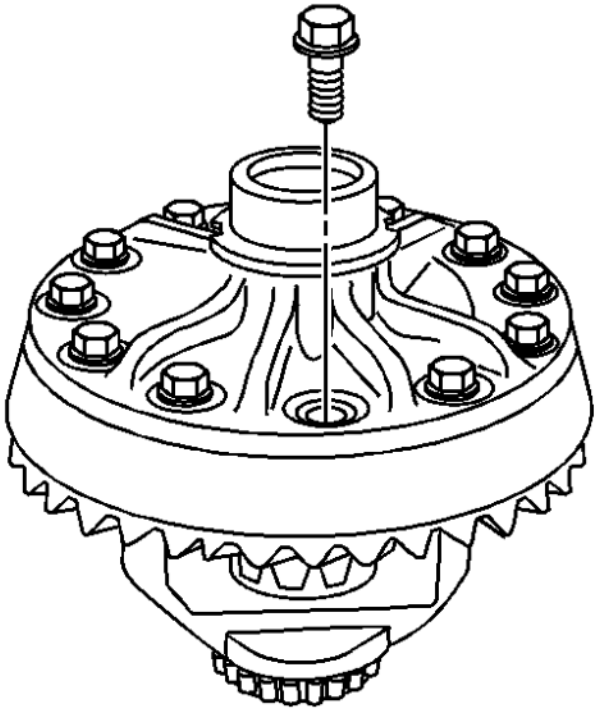


Fig. 128: Ring Gear Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Use hand tools ONLY. DO NOT use power tools for the following procedure.**

3. Hand tighten the new ring gear bolts.

CAUTION: **Refer to Fastener Caution .**

4. Install the NEW ring gear bolts and tighten to 165 N.m (122 lb ft) in a crisscross pattern to draw and seat the ring gear and the on the differential case.
5. Install the drive pinion housing assembly. Refer to **Differential Drive Pinion Gear Bearing Retainer Replacement (10.5 Inch Axle)**.
6. Install the differential assembly. Refer to **Differential Replacement (10.5 Inch Axle)**.
7. Fill the axle with the proper lubricant. Refer to **Differential Oil Replacement (10.5 Inch Axle)**.
8. Remove the support and lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR BEARING REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

Special Tools

- **DT-47688** Pinion Bearing Remover
- **DT-49032** Inner Pinion Bearing Race Installer
- **J-7818** Inner Bearing Race Installer

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- **J-26909** Outer Bearing Race Installer
- **J-8092** Universal Driver Handle 3/4 - 10
- **J-8592** Universal Driver Handle 3/4 - 10
- **J-8608** Pinion Bearing Cup Installer
- **J-8611-01** Pinion Bearing Cup Installer
- **J-8614-01** Flange Holder and Remover
- **J-22306** Bearing Race Installer
- **J-45240** Inner Pinion Bearing Race Installer
- **J-22828** Input Shaft Gear Installer
- **J-22912** Bearing Remover
- **J-49275** Inner Pinion Bearing Remover
- **J-36614** Inner Pinion Bearing Installer

Disassemble Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential assembly. Refer to **Differential Replacement (8.6/9.5/9.76 Inch Axles)**.
3. Remove the drive pinion from the axle. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.

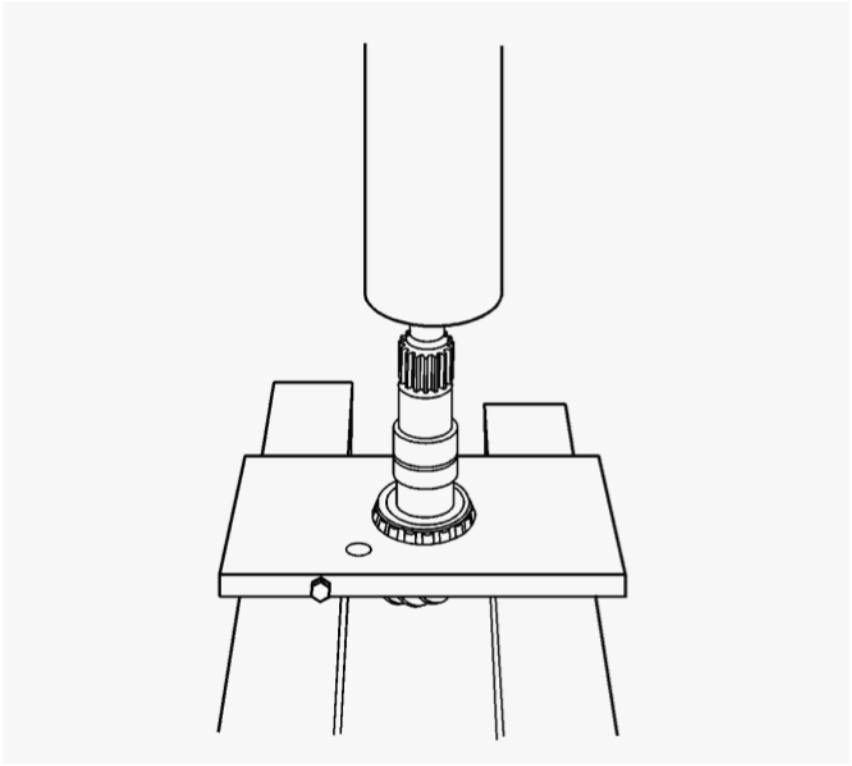


Fig. 129: Removing Bearing From Drive Pinion

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Courtesy of GENERAL MOTORS COMPANY

NOTE: **Step 4 is for those vehicles equipped with the 8.6 inch axle.**

4. Using the **DT-47688** remover or **DT-49275** remover and a press, remove the bearing from the drive pinion.

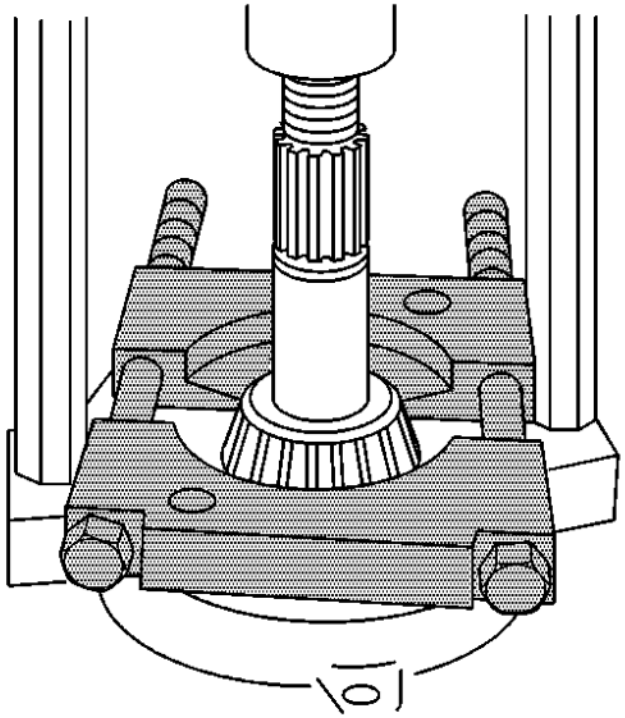


Fig. 130: Pressing Bearing Off Pinion
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Step 5 is for those vehicles equipped with the 9.5 and 9.76 inch axle.**

5. Using the **J 22912** remover and a press, remove the differential pinion bearing.

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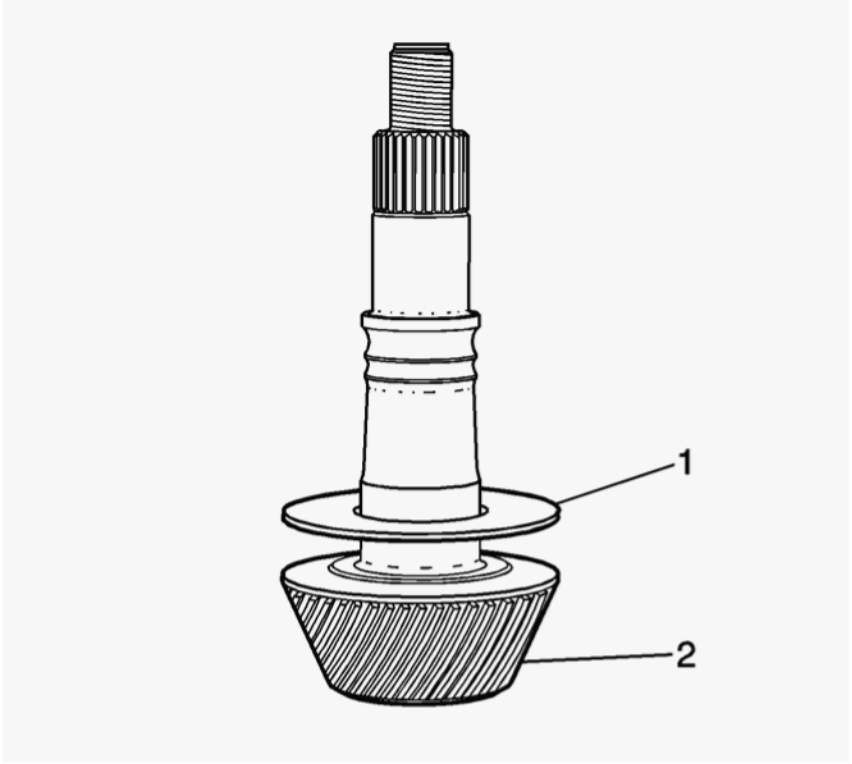


Fig. 131: Selective Pinion Spacer And Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

6. Remove the shim (1).

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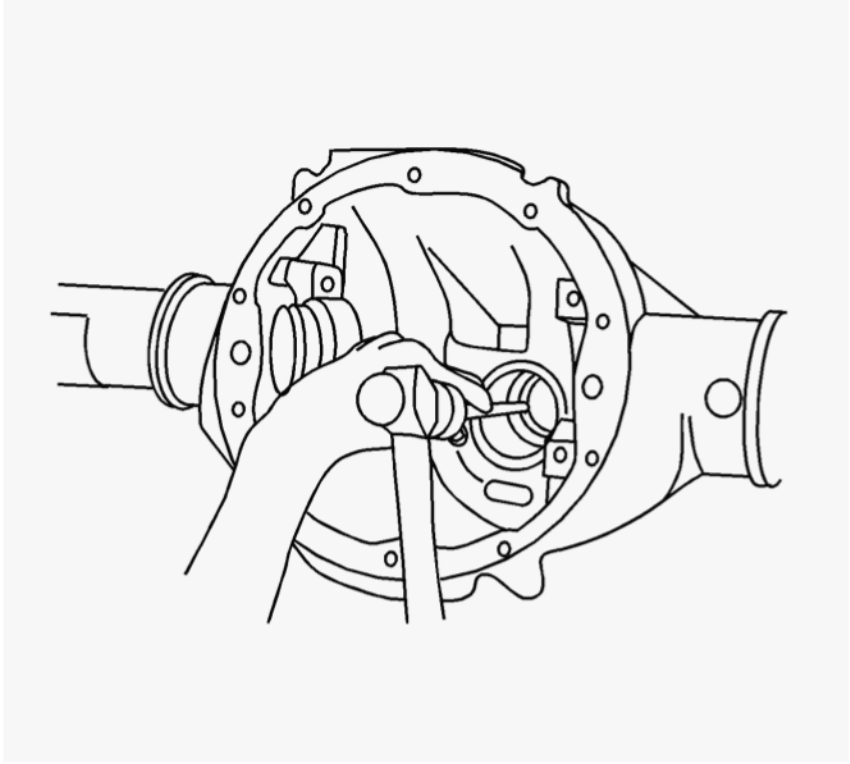


Fig. 132: Removing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE: **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.**

7. Using a hammer and a brass drift in the slots provided, remove the outer pinion bearing cup from the axle housing.

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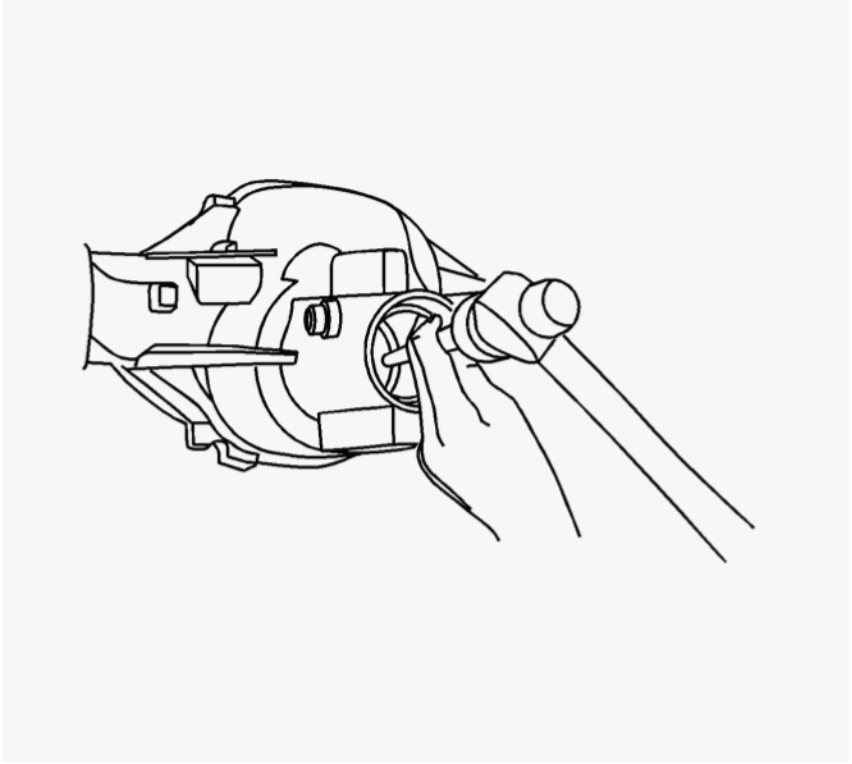


Fig. 133: Removing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE: **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.**

8. Using a hammer and a brass drift in the slots provided, remove the inner pinion bearing cup from the axle housing.

Assemble Procedure

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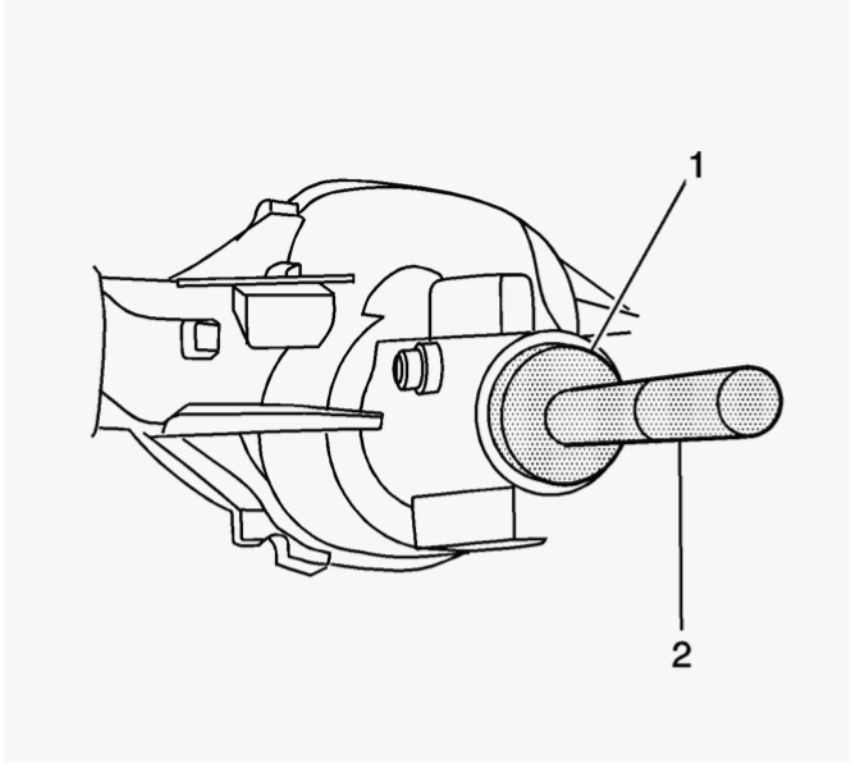


Fig. 134: Installing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

1. Using the **J-8611-01** installer (1), 8.6 inch axle, or the **J-7818** installer (1), 9.5 inch axle, or the **J-29609** installer (1), 9.76 inch axle and the **J-8092** handle (2), install the outer pinion bearing cup.

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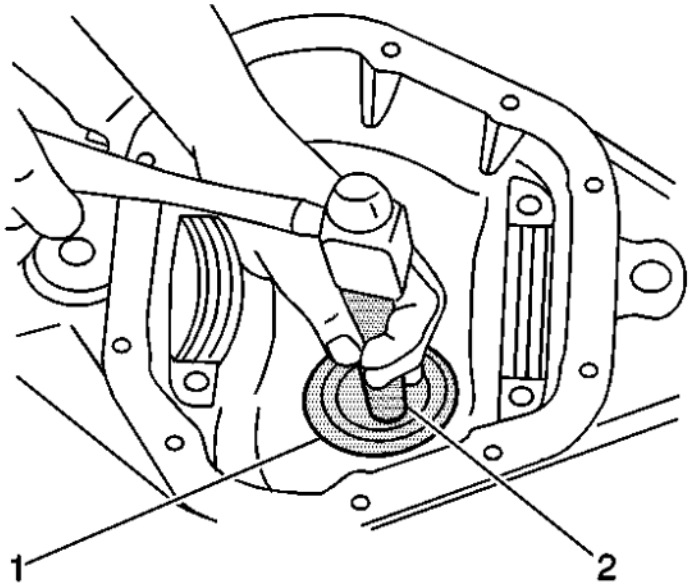


Fig. 135: Installing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

2. Using the **DT-49032** installer (1), 8.6 inch axle, or the **J-22306** installer (1), 9.5 inch axle, **J-45240** Installer (1), 9.76 inch axle and the **J-8592** handle (2), install the inner pinion bearing cup.
3. Determine the selective shim thickness for the drive pinion. Refer to **Pinion Depth Adjustment (8.6 Inch Axle)Pinion Depth Adjustment (9.5 Inch Axle)Pinion Depth Adjustment (9.76 Inch Axle)**.

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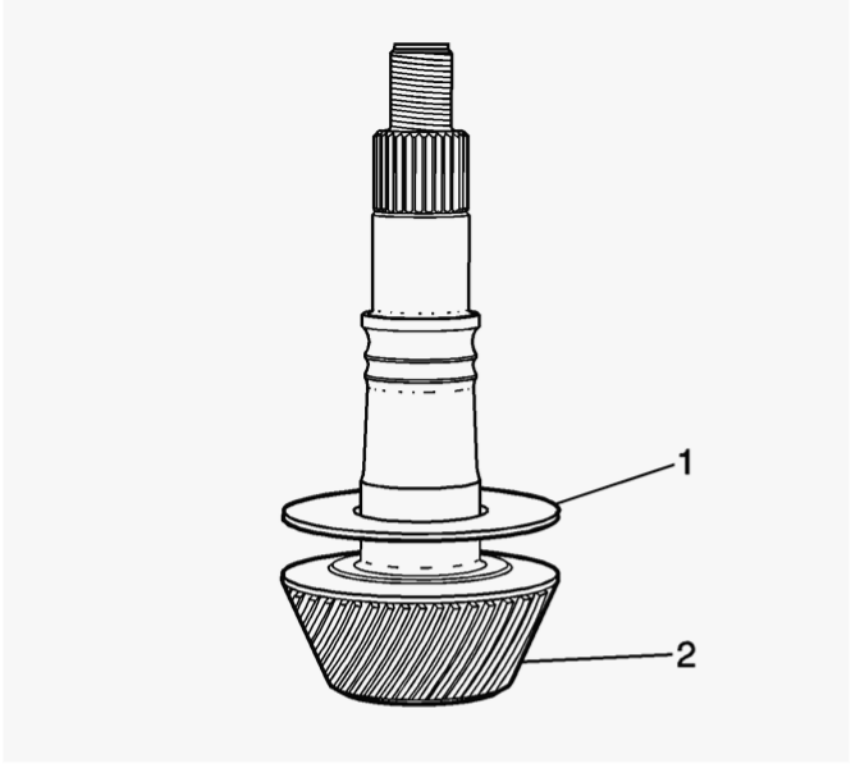


Fig. 136: Selective Pinion Spacer And Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

4. Install the selective shim (1) on the shoulder on the differential pinion gear (2).

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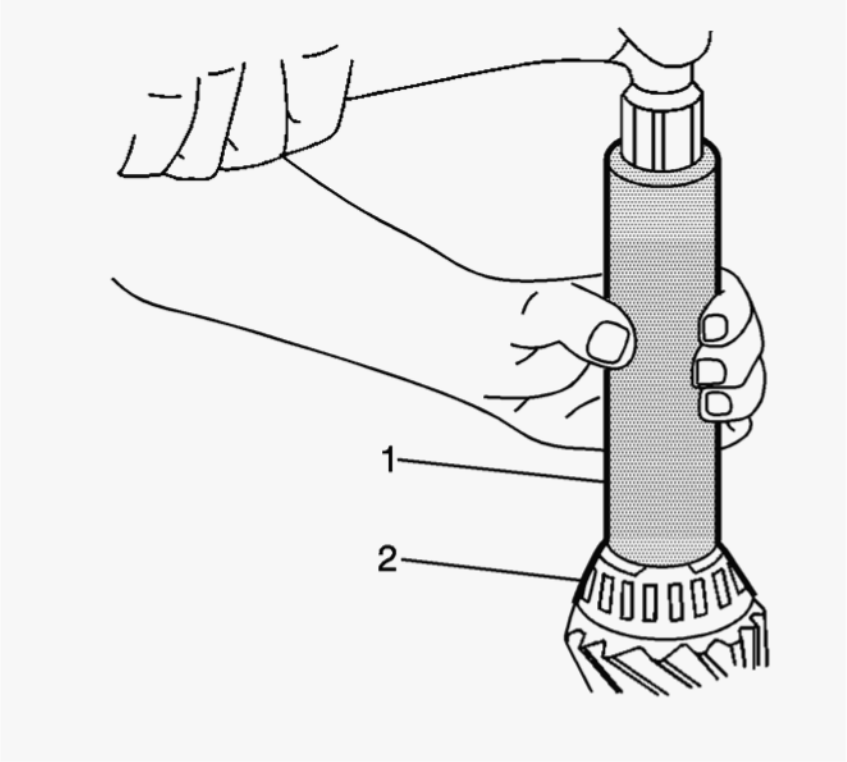


Fig. 137: Installing Inner Pinion Bearing Onto Pinion Gear
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Press the bearing on until the cone seats on the pinion shim.**

5. Using the **J-22828** installer (1), 8.6 inch axle, or the **J-36614** installer (1), 9.5 inch LD axle, **J-44412** Installer (1), 9.76 inch axle, install the inner pinion bearing (2).

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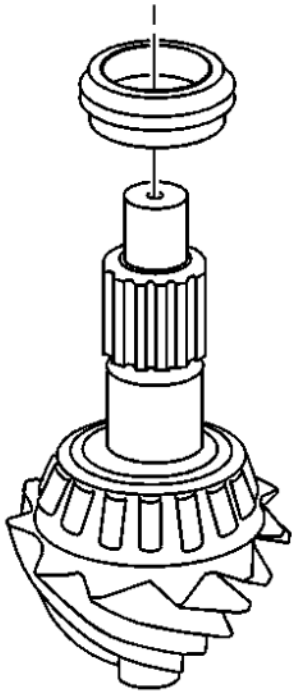


Fig. 138: Collapsible Spacer
Courtesy of GENERAL MOTORS COMPANY

6. Install a new collapsible spacer.
7. Lubricate the pinion bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .
8. Install the outer pinion bearing into the axle housing.
9. Install the differential pinion gear into the axle housing.

NOTE: **DO NOT re-use the old pinion nut, replace with NEW only.**

10. Install the NEW differential pinion oil seal, flange/yoke, and the NEW nut and washer. Refer to **Differential Drive Pinion Gear Yoke Replacement (8.6/9.5/9.76 Inch Axles)**, and **Differential Drive Pinion Gear Seal Replacement (8.6/9.5/9.76 Inch Axles)**.

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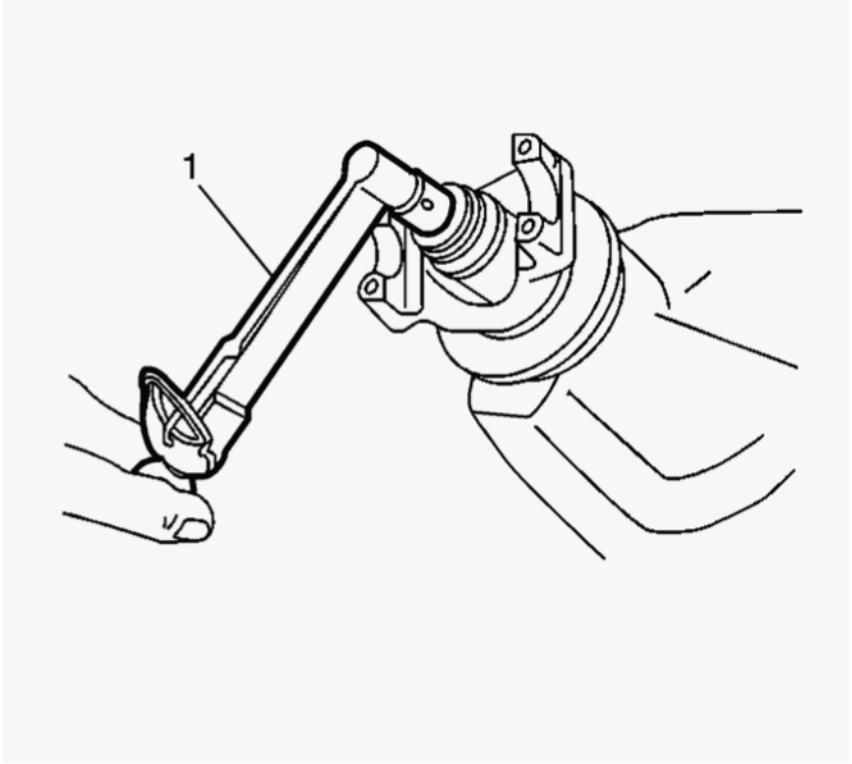


Fig. 139: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

11. Using an inch-pound torque wrench, measure 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.
12. 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 in small increments, 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.
13. Once the specified torque is obtained, rotate the pinion several times to ensure the bearings have seated.
14. Recheck the rotating torque of the pinion bearing and adjust if necessary.
15. Install the differential assembly. Refer to **Differential Replacement (8.6/9.5/9.76 Inch Axles)**.
16. Fill the axle with lubricant. Use the proper fluid. Refer to **Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)**.
17. Remove the support and lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR BEARING REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **J 8092** Universal Driver Handle - 3/4 in - 10
- **J 8608** Pinion Bearing Cup Installer
- **J 8614-01** Flange Holder and Remover
- **J 22761** Side Bearing Installer
- **J 22912-B** Bearing Remove

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- **J 24433** Pinion Bearing Installer
- **J 37624** Pinion Bearing Installer
- **J 44414** Pinion Oil Seal Installer

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

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the differential assembly. Refer to **Differential Replacement (10.5 Inch Axle)**.
3. Remove the pinion gear bearing retainer. Refer to **Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle)**.
4. Remove the pinion yoke and the oil seal. Refer to **Differential Drive Pinion Gear Seal Replacement (10.5 Inch Axle)**.
5. Remove the outer pinion bearing.

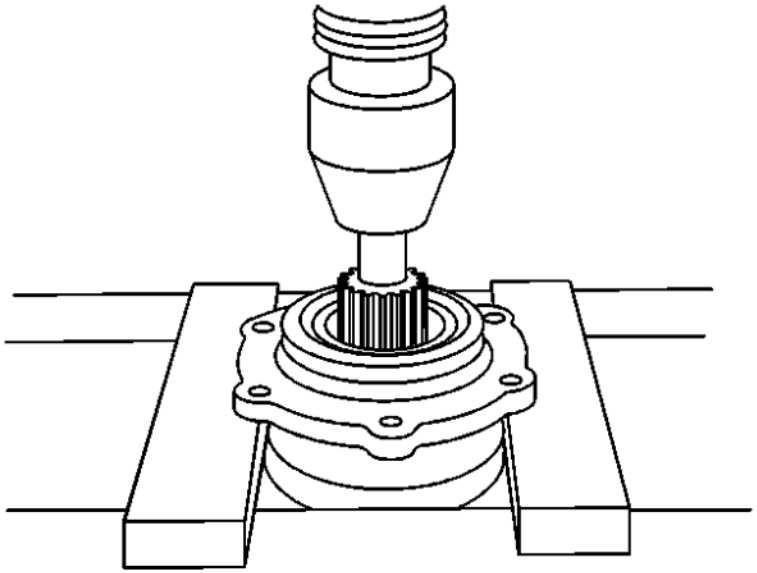


Fig. 140: Removing Pinion
Courtesy of GENERAL MOTORS COMPANY

6. Using an hydraulic press and the appropriate supports, remove the differential pinion gear.

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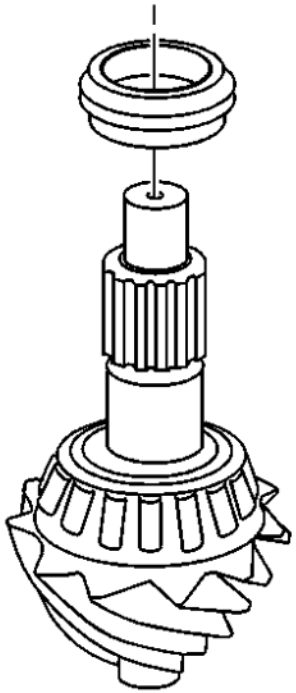


Fig. 141: Removing Collapsible Spacer
Courtesy of GENERAL MOTORS COMPANY

7. Remove the collapsible spacer.

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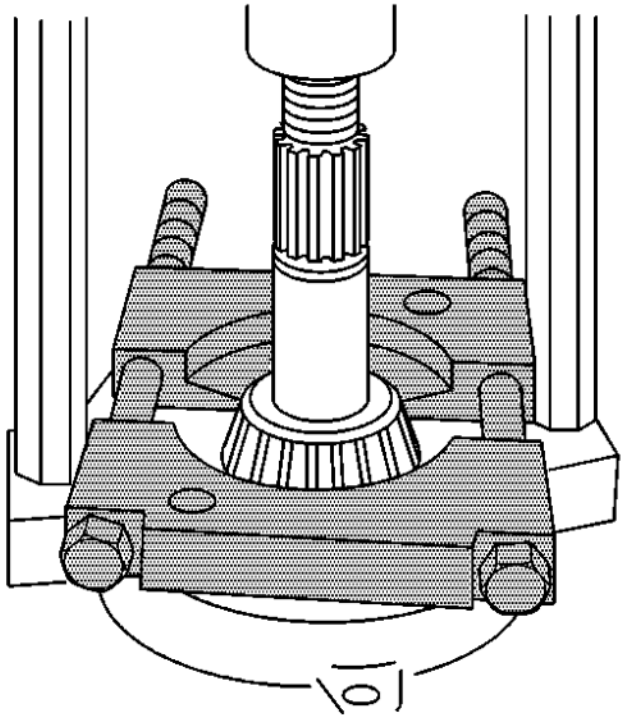


Fig. 142: Inner Pinion Bearing And Hydraulic Press
Courtesy of GENERAL MOTORS COMPANY

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

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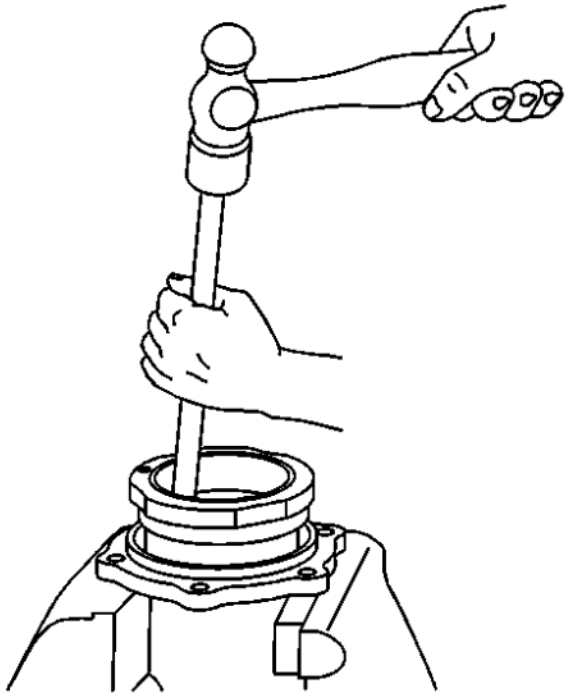


Fig. 143: Removing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **Insert the brass drift in the slots to remove the bearing cup.**
- **Move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.**

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

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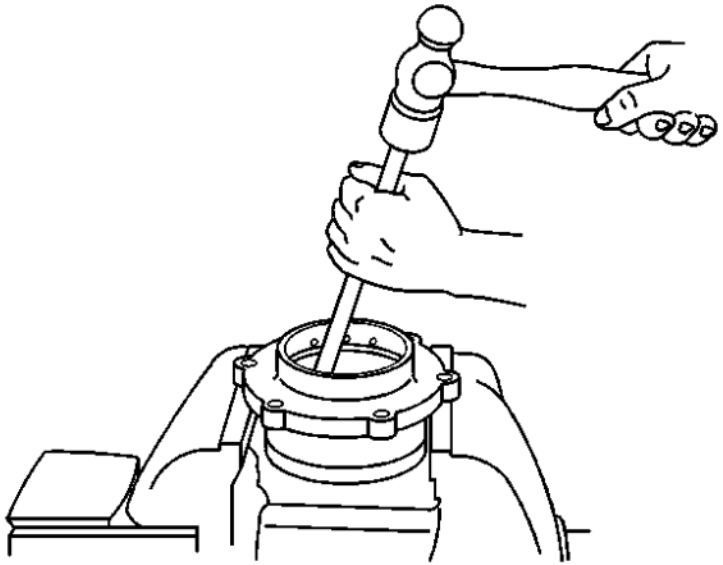


Fig. 144: Removing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **Insert the brass drift in the slots to remove the bearing cup.**
- **Move the drift back and forth between one side of the cup and the other in order to work the cups out of the retainer evenly.**

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

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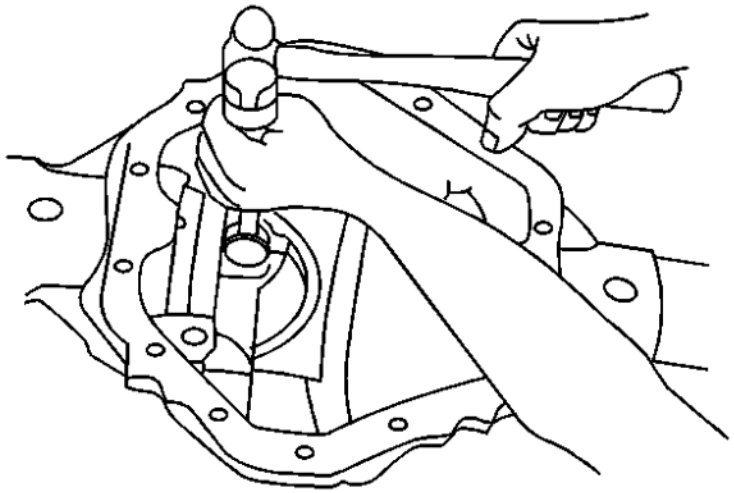


Fig. 145: Removing Pinion Gear Pilot Bearing
Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

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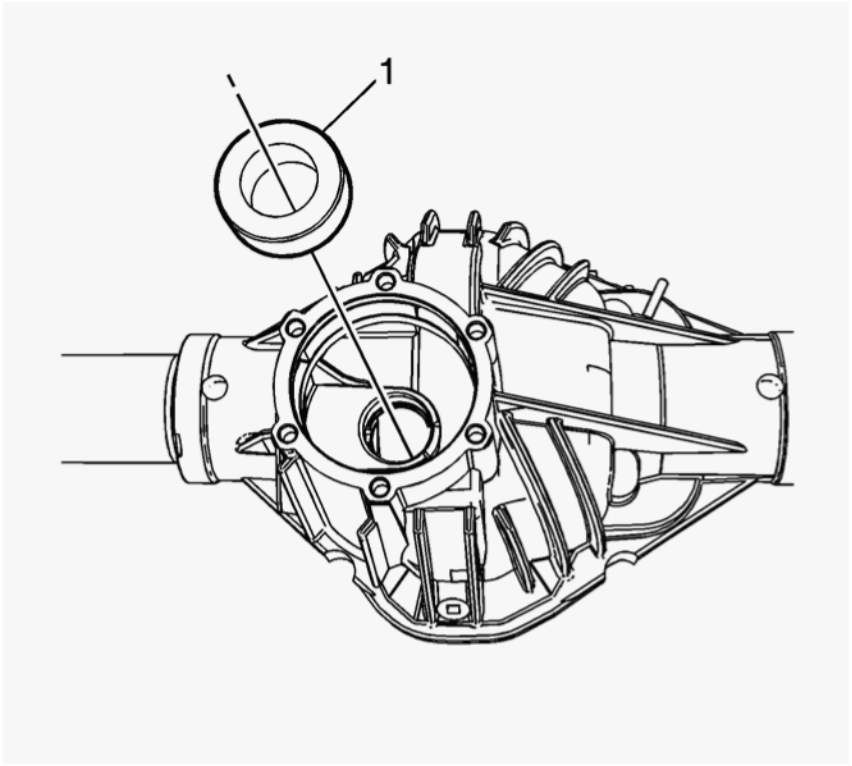


Fig. 146: Pinion Pilot Gear Bearing
Courtesy of GENERAL MOTORS COMPANY

1. Position the drive pinion pilot gear bearing (1) in the differential housing.

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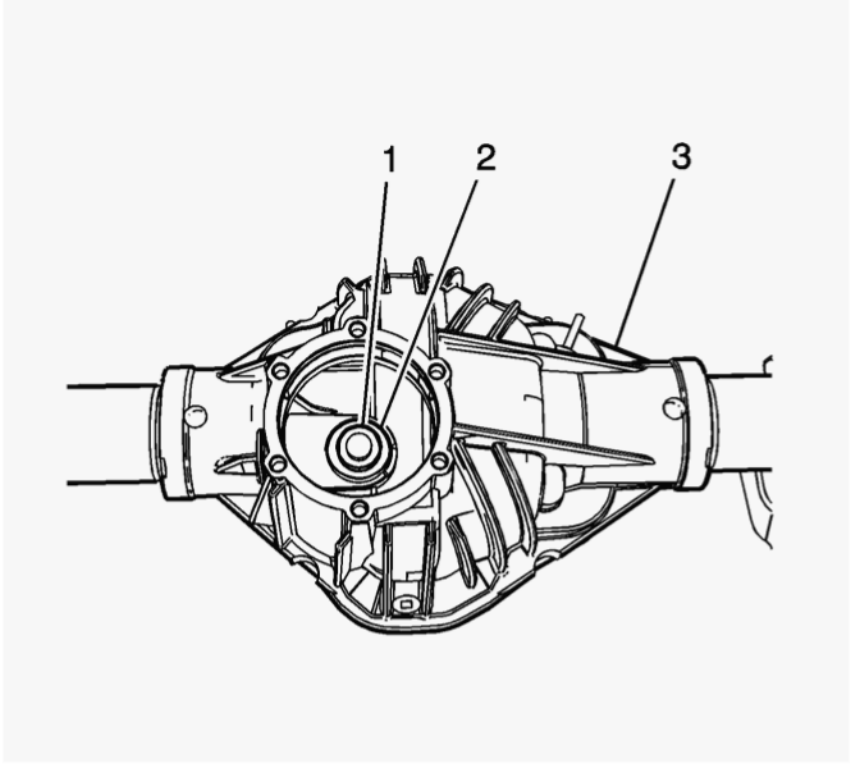


Fig. 147: Differential Housing And Special Tools
Courtesy of GENERAL MOTORS COMPANY

2. Using the **J 22761** installer (1) and the **J 8092** driver (2), install the drive pinion gear pilot bearing in the differential housing (3).

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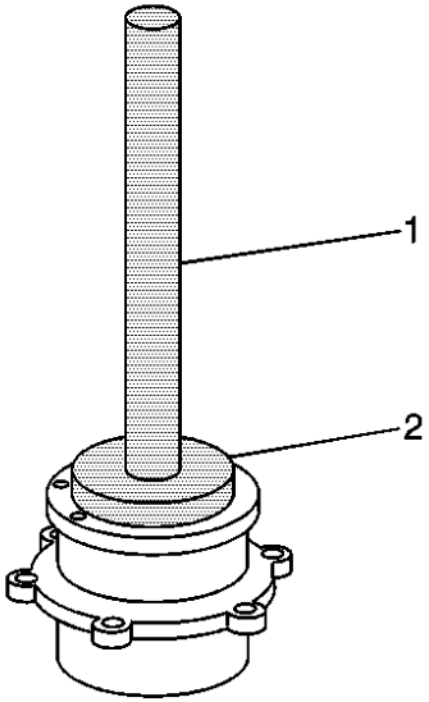


Fig. 148: Installing Inner Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

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

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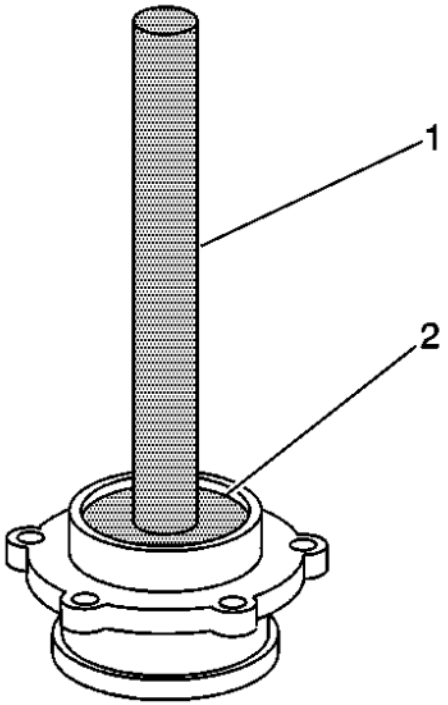


Fig. 149: Installing Outer Pinion Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

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

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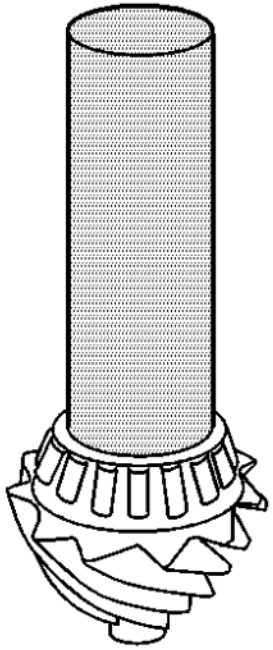


Fig. 150: Installing Inner Pinion Bearing
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Press the bearing on until the cone seats on the pinion.**

5. Using the **J 24433** installer and a hydraulic press, install the inner pinion bearing.

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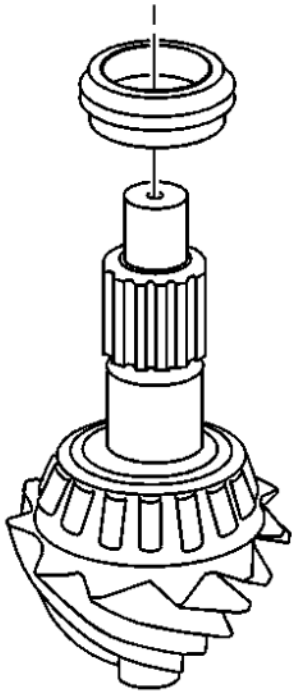


Fig. 151: Collapsible Spacer
Courtesy of GENERAL MOTORS COMPANY

6. Install the new collapsible spacer.
7. Lubricate the pinion bearings with axle lubricant. Refer to **Fluid and Lubricant Recommendations** .
8. Install the outer pinion bearing into the pinion bearing retainer.
9. Using the **J 44414** installer, install the new pinion oil seal.

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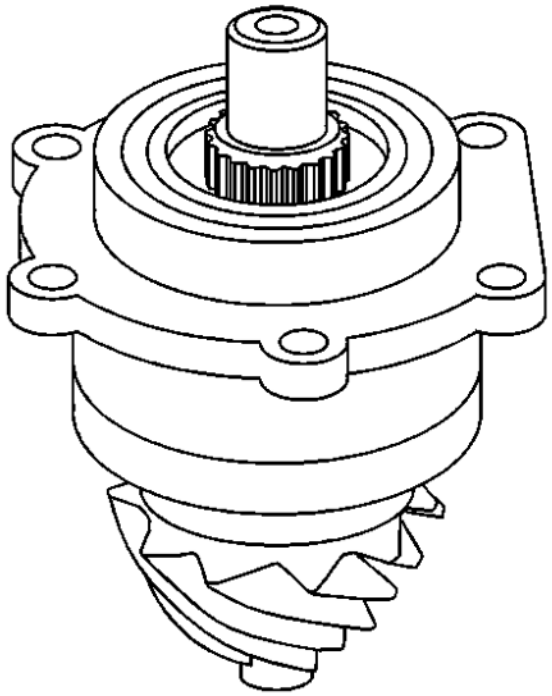


Fig. 152: Installing Pinion Into Pinion Gear Bearing Retainer
Courtesy of GENERAL MOTORS COMPANY

10. Install the pinion in the pinion gear bearing retainer.
11. Install the drive pinion flange/yoke. Refer to **Differential Drive Pinion Gear Seal Replacement (10.5 Inch Axle)**.

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

12. 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.
13. Install the pinion gear bearing retainer to the axle housing.

CAUTION: **Refer to Fastener Caution .**

14. Install the pinion bearing retainer bolts and tighten to 88 N.m (65 lb ft).

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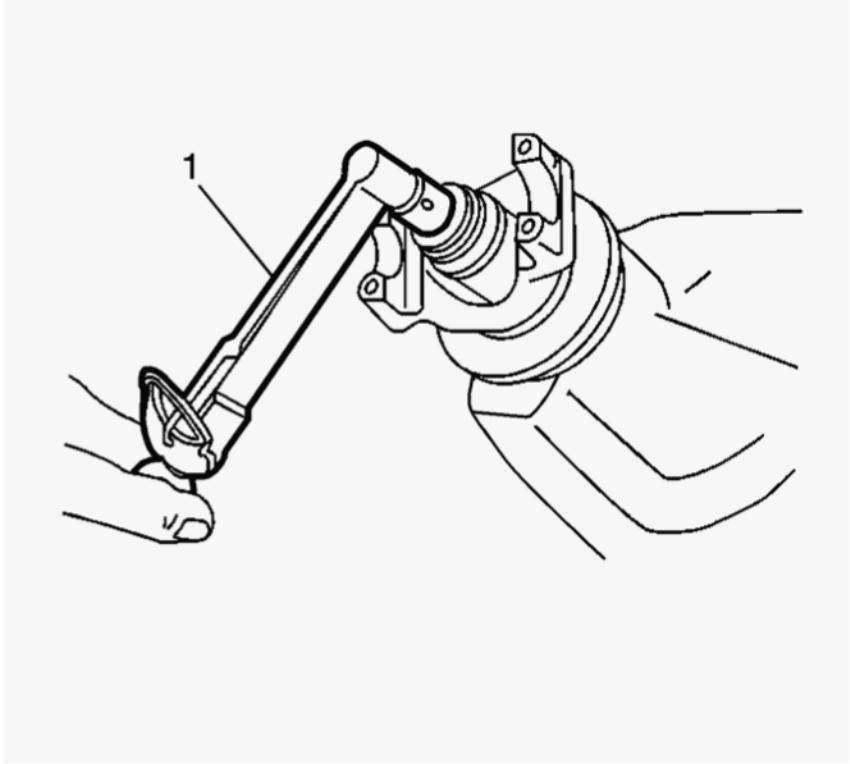


Fig. 153: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

15. Using an inch-pound torque wrench, measure the rotational torque of the pinion it 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.
16. 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, use the **J 8614-01** remover and continue to tighten the pinion nut in small increments until the rotational torque 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.
17. 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.

18. Install the differential assembly. Refer to **Differential Replacement (10.5 Inch Axle)**.
19. Adjust the differential side bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (10.5 Inch Axle)**.
20. Determine the selective shim thickness for the drive pinion. Refer to **Pinion Depth Adjustment (10.5 Inch Axle)**.
21. Adjust the backlash. Refer to **Backlash Adjustment (10.5 Inch Axle)**.
22. Fill the axle with lubricant. Refer to **Differential Oil Replacement (10.5 Inch Axle)**.
23. Remove the support and lower the vehicle.

DIFFERENTIAL REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

Removal Procedure

NOTE: **Group and mark the shims together as originally removed. If you remove or replace the differential ring and pinion gear set, perform the bearing preload, backlash,**

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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 of the components (pinion and ring gear set, bearings. etc.) then you may reinstall the differential carrier with the original shims in their original locations. ALWAYS perform a gear tooth contact pattern check, even when you remove only the differential carrier.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement**.

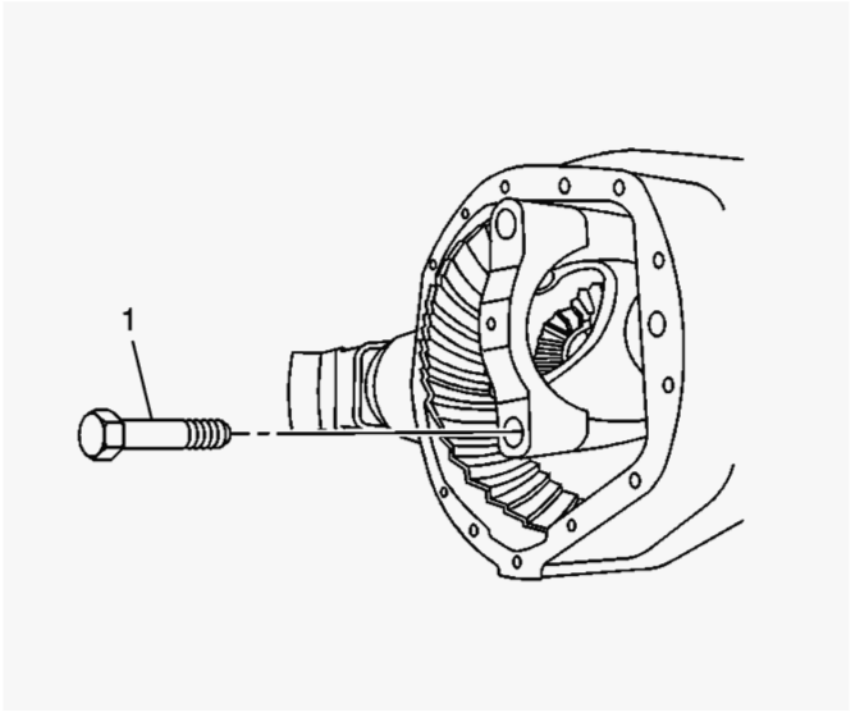


Fig. 154: Bearing Cap Bolts
Courtesy of GENERAL MOTORS COMPANY

WARNING: **Refer to Differential Case Removal Warning .**

NOTE: **Mark the bearing caps left and right before removing.**

3. Remove the bearing cap bolts (1) and caps.

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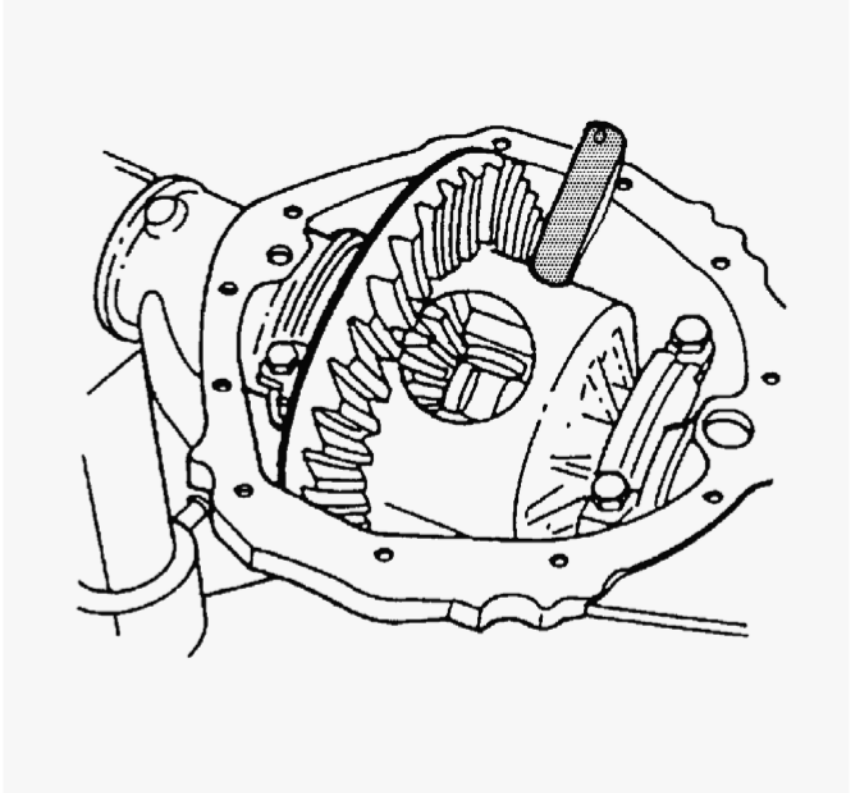


Fig. 155: Pinion Shaft Touching Housing
Courtesy of GENERAL MOTORS COMPANY

4. 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.

CAUTION: **Refer to Differential Housing Cover and Gasket Removal Caution .**

5. Rotate the drive pinion clockwise in order to force the differential assembly out of the axle housing.
6. Remove the differential assembly.
7. Remove the bearing cups, the shims, and the spacers as necessary.
8. Remove the differential side bearings. Refer to **Differential Bearing Replacement**.
9. Remove the differential ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.

Installation Procedure

1. Install the differential ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.
2. Install the differential side bearings. Refer to **Differential Bearing Replacement**.
3. Using the proper axle lubricant, lubricate the differential side bearings. Refer to **Fluid and Lubricant Recommendations** .

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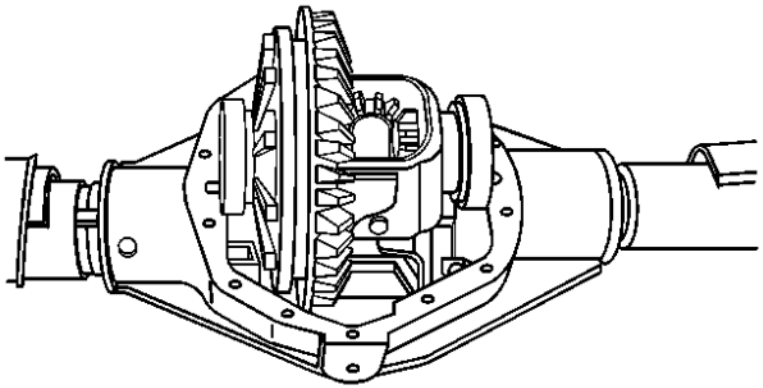


Fig. 156: Differential Case And Axle Housing
Courtesy of GENERAL MOTORS COMPANY

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

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

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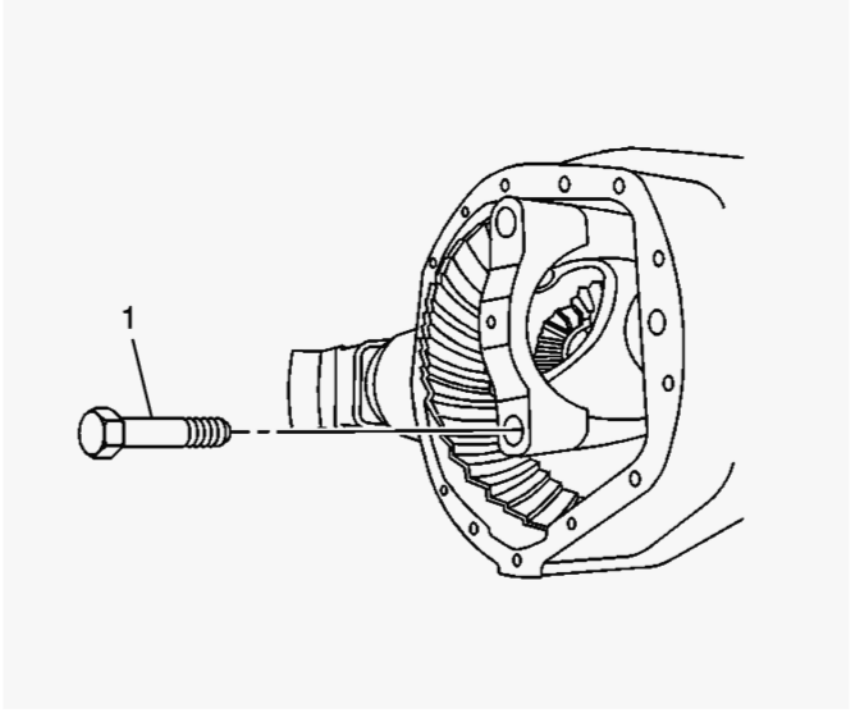


Fig. 157: Bearing Cap Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: **DO NOT torque the bearing cap bolts at this time.**

5. Install the bearing caps and the bolts (1).
6. Adjust the differential side bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (9.5/9.76 Inch Axle)Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)**.
7. Adjust the backlash. Refer to **Backlash Adjustment (9.5/9.76 Inch Axle)Backlash Adjustment (8.6 Inch Axle)**.
8. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.

CAUTION: **Refer to Fastener Caution .**

9. Tighten the bearing cap bolts to 75 N.m (55 lb ft) for the 8.6 inch axle or 60 N.m (44 lb ft) + 30 degrees for the 9.5/9.76 inch axle.
10. Install the axle shafts. Refer to **Rear Axle Shaft Replacement**.
11. Fill the axle with the proper lubricant. Refer to **Differential Oil Replacement (8.6 Inch Axle)Differential Oil Replacement (9.5/9.76 Inch Axle)**.
12. Lower the vehicle.

DIFFERENTIAL REPLACEMENT (10.5 INCH AXLE)

Special Tools

J 24429 Side Bearing Backlash Spanner

Removal Procedure

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1. Raise and support the vehicle the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the axle shafts. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**.
3. Remove the rear axle housing cover and the gasket. Refer to **Rear Axle Housing Cover Replacement (10.5 Inch Axle)**, and **Rear Axle Housing Cover Gasket Replacement (10.5 Inch Axle)**.

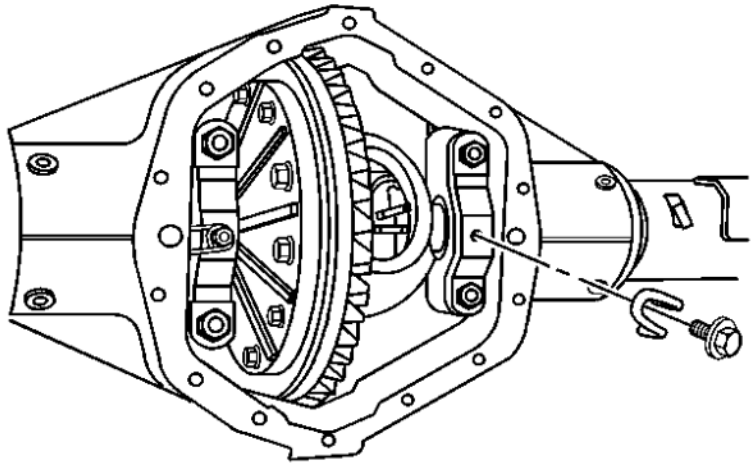


Fig. 158: Removing Differential Bearing Adjuster Nut Retainers
Courtesy of GENERAL MOTORS COMPANY

4. Remove the differential bearing adjuster nut retainers.

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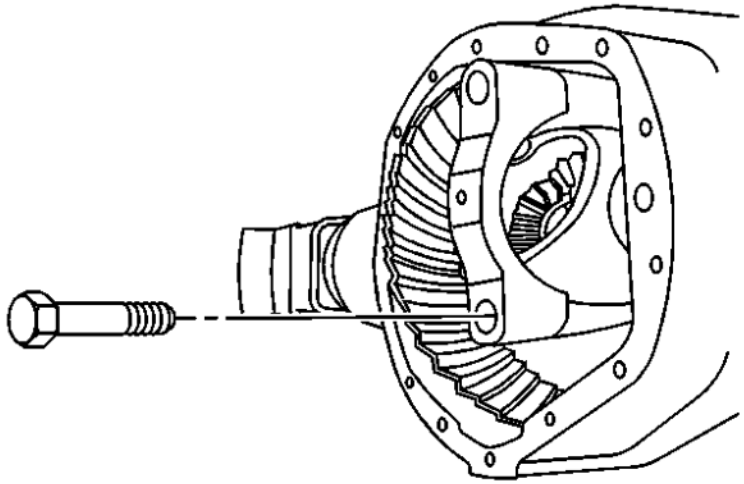


Fig. 159: Bearing Cap Bolt
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Mark the bearing caps left and right.**

5. Remove the bearing caps and bolts.

WARNING: **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.**

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

6. Using the **J 24429** spanner, loosen the adjusters.

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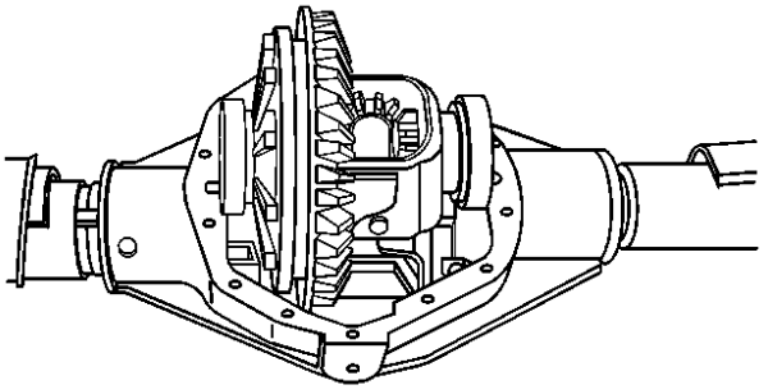


Fig. 160: Differential Case And Axle Housing
Courtesy of GENERAL MOTORS COMPANY

7. Remove the differential assembly.

NOTE: **Mark the cups left and right. Place the cups with the bearing caps.**

8. Remove the bearing cups.
9. Remove the differential side bearings, if necessary. Refer to **Differential Bearing Replacement**.
10. Remove the differential ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

Installation Procedure

1. Install the differential ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
2. Install the differential side bearings, if necessary. Refer to **Differential Bearing Replacement**.
3. Lubricate the differential side bearings with axle lubricant. Use the proper fluid. Refer to **Fluid and Lubricant Recommendations** .

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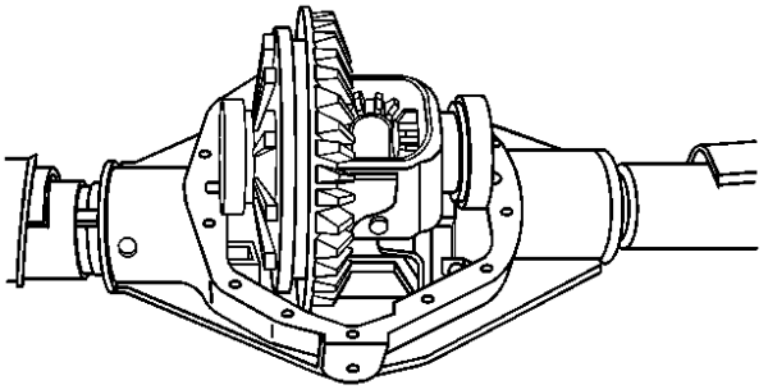


Fig. 161: Differential Case And Axle Housing
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Support the differential case in order to keep the differential case from falling out of the axle housing.**

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

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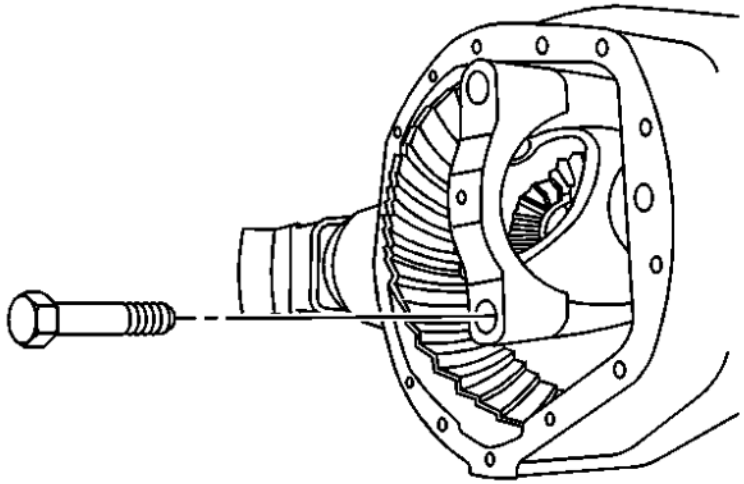


Fig. 162: Bearing Cap Bolt
Courtesy of GENERAL MOTORS COMPANY

NOTE: **DO NOT torque the bearing cap bolts at this time.**

5. Install the bearing caps and the bolts.

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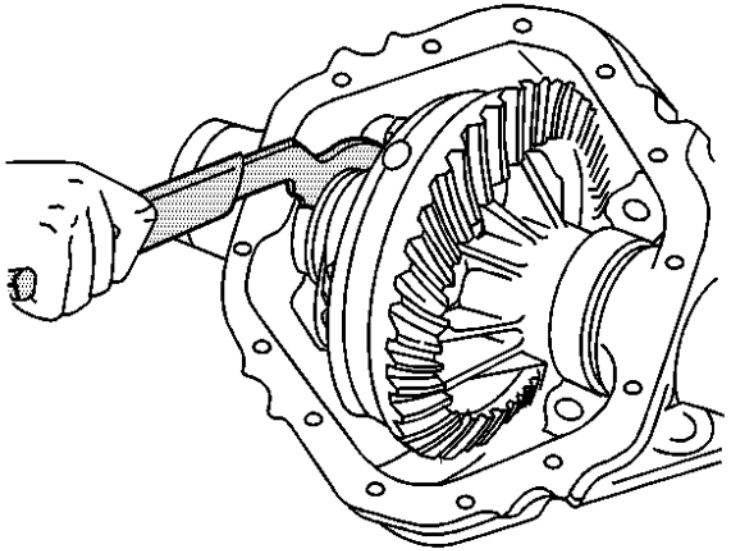


Fig. 163: Turning Adjusters
Courtesy of GENERAL MOTORS COMPANY

6. Using the **J 24429** spanner, turn the adjusters evenly on each side until snug against the differential.
7. Adjust the differential side bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (10.5 Inch Axle)**.
8. Adjust the backlash. Refer to **Backlash Adjustment (10.5 Inch Axle)**.
9. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.

CAUTION: **Refer to Fastener Caution .**

10. Tighten the bearing cap bolts to 185 N.m (136 lb ft) for the and 10.5 inch axle, or 282 N.m (208 lb ft) for the 11.5 inch axle.

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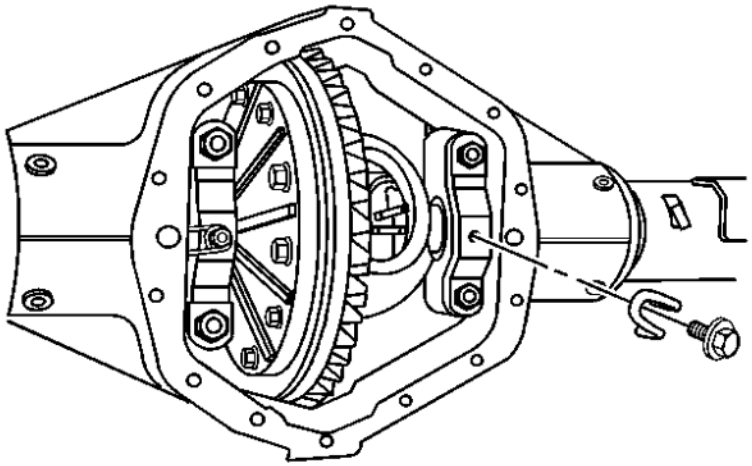


Fig. 164: Differential Bearing Adjuster Nut Retainers
Courtesy of GENERAL MOTORS COMPANY

11. Install the differential bearing adjuster nut retainers.

    Tighten to 34 N.m (25 lb ft) for the 10.5 Inch Axle.

    Tighten to 27 N.m (20 lb ft) for the 11.5 Inch Axle.

12. Install the axle shafts and new gaskets. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**.
13. Install the rear axle housing cover and a new gasket. Refer to **Rear Axle Housing Cover Replacement (10.5 Inch Axle)**, and **Rear Axle Housing Cover Gasket Replacement (10.5 Inch Axle)**.
14. Fill the axle with lubricant. Use the proper fluid. Refer to **Approximate Fluid Capacities**, and **Fluid and Lubricant Recommendations** .
15. Remove the support and lower the vehicle.

DIFFERENTIAL BEARING REPLACEMENT

Special Tools

- **J-8092** Universal Driver Handle - 3/4 in - 10
- **J-8107-4** Side Bearing Remover Plug
- **J-8107-5** Side Bearing Remover Plug
- **J-21784** Side Bearing Installer
- **J-22888-D** Side Bearing Puller Set

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- **J-22888-20 A** Side Bearing Puller
- **J-29710** Differential Side Bearing Installer
- **J-36597** Side Bearing Remover Pilot
- **J-44420** Differential Bearing Installer

Removal Procedure

1. Remove the differential assembly. Refer to **Differential Replacement (8.6/9.5/9.76 Inch Axles)Differential Replacement (10.5 Inch Axle)**.

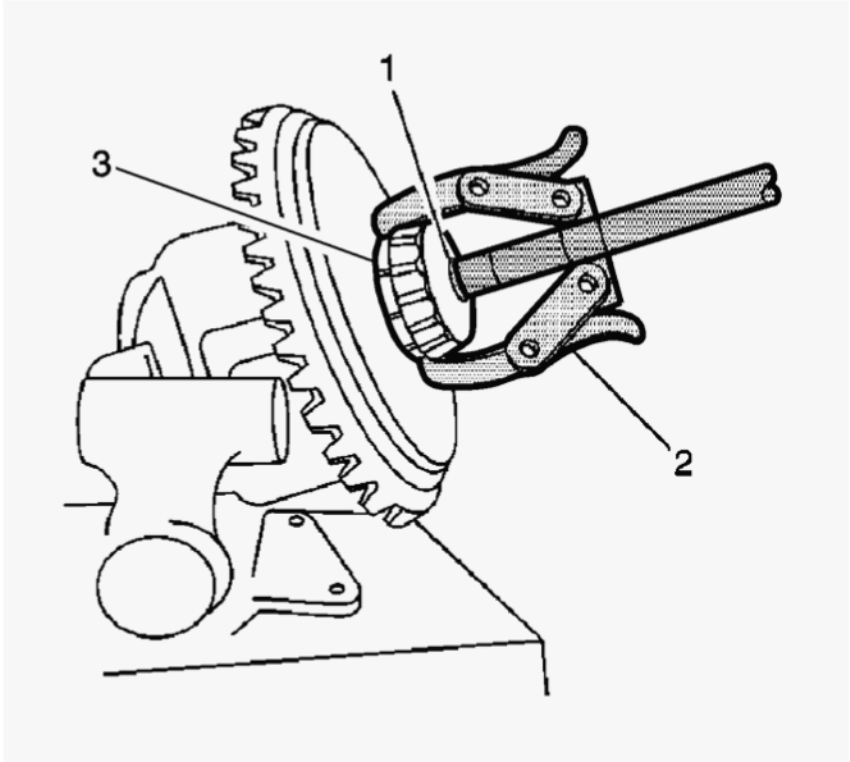


Fig. 165: Differential Side Bearings And Special Tool
Courtesy of GENERAL MOTORS COMPANY

2. Install the 8.6, 9.5, and the 11.5 inch differential assembly into a vise.

NOTE: **Place a block of wood on each side of the differential assembly.**

3. Install the 10.5 inch differential assembly into a vise.

NOTE: **Step 4 is for the 8.6 inch axle.**

4. Using the **J22888-20 A** puller (2) and the **J-8107-4** plug (1), remove the differential side bearing.

NOTE: **Step 5 is for the 9.5/10.5 inch axles.**

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5. Using the **J-22888-20 A** puller (2) and the **J-36597** pilot (1), remove the differential side bearing.

NOTE: **Step 6 is for the 11.5 inch axle.**

6. Using the **J-22888-20 A** puller (2) and the **J-8107-5** plug (1), remove the differential side bearing.

Installation Procedure

NOTE: **In order to protect the differential case, install the following special tools on the opposite side of the differential case of the bearing being installed:**

-
- For the 8.6 inch axle, install the **J-8107-4** plug
- For the 9.5/10.5 inch axles, install the **J-36597** pilot
- For the 11.5 inch axle, install the **J-8107-5** plug

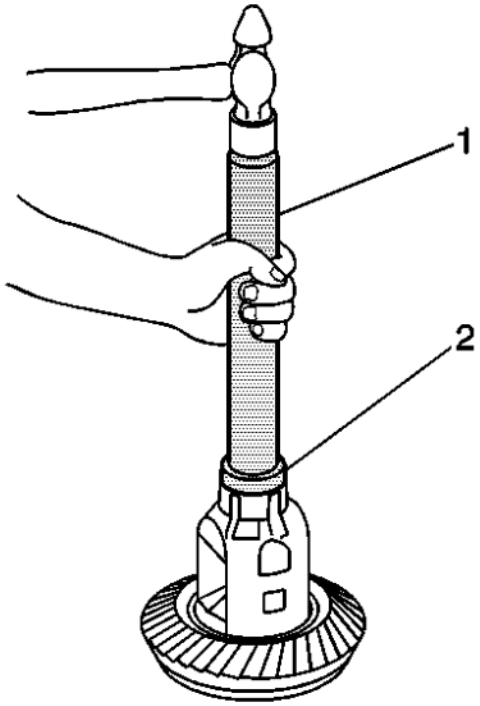


Fig. 166: Driving Differential Side Bearing Into Position
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Step 1, is for the 8.6 inch axle.**

1. Using the **J-8092** driver (1), **J-21784** installer (2) and a hammer, install the differential side bearing.

NOTE: **Step 2, is for the 9.5/10.5 inch axles.**

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2. Using the **J-8092** handle (1), **J-29710** installer (2) and a hammer, install the differential side bearing.

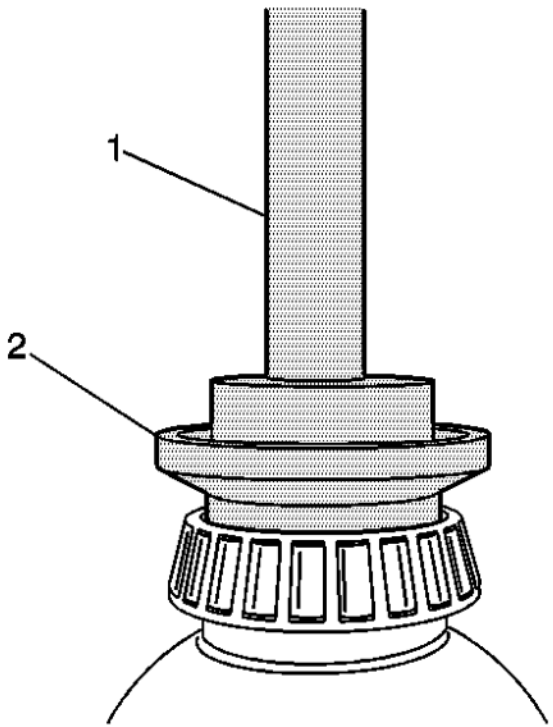


Fig. 167: Installing Differential Side Bearings (11.5 Inch Axles)
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Step 3, is for the 11.5 inch axle.**

3. Using the **J-8092** handle (1) **J-44420** installer (2) and a hammer, install the differential side bearing.
4. Install the differential assembly. Refer to **Differential Replacement (8.6/9.5/9.76 Inch Axles)Differential Replacement (10.5 Inch Axle)**.

REAR AXLE REPLACEMENT (10.5 INCH AXLE)

Removal Procedure

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

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Place jack or utility stands (such as GMDE 123-B67313) at the front end of the vehicle.
3. Support the axle with jack stands.
4. Remove the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .

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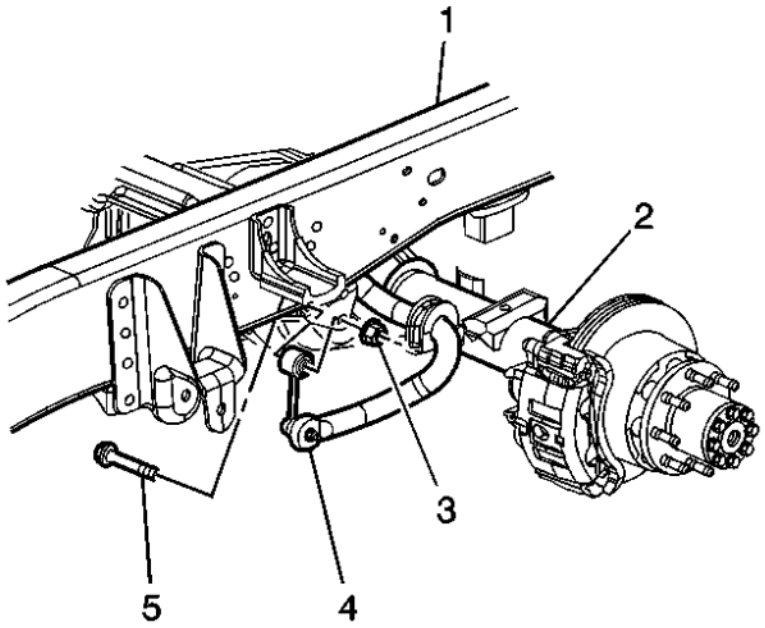


Fig. 168: Stabilizer Shaft Link, Bolt & Nut
Courtesy of GENERAL MOTORS COMPANY

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

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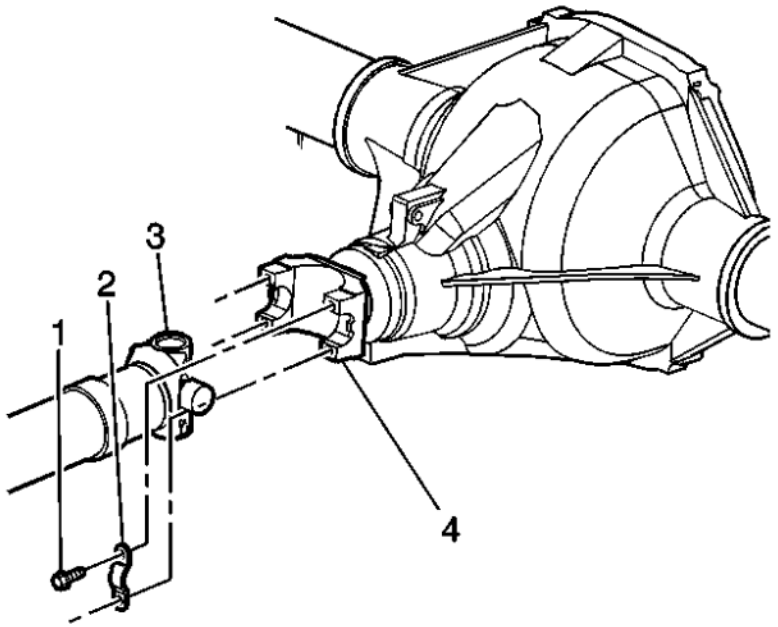


Fig. 169: Propeller Shaft, Rear Axle Pinion Yoke, Yoke Retainers And Bolts
Courtesy of GENERAL MOTORS COMPANY

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

   Support the propeller shaft as necessary.

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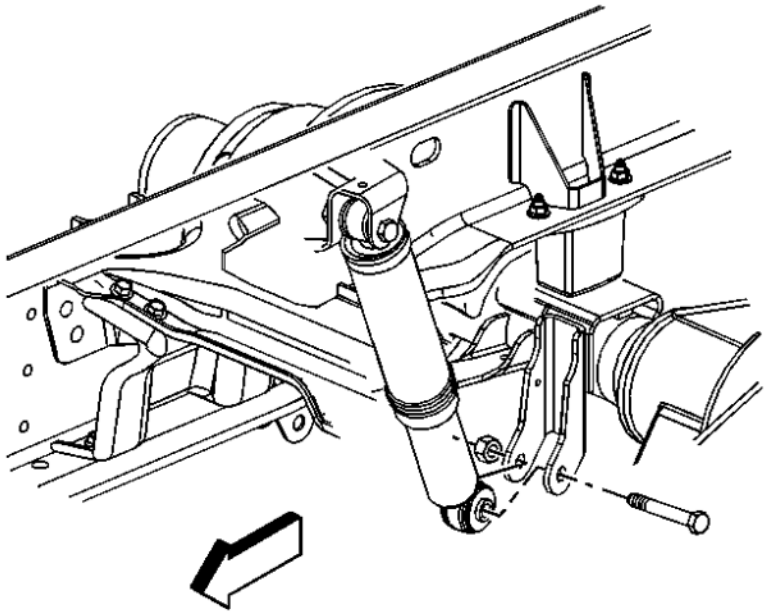


Fig. 170: Shock Absorber Lower Mount
Courtesy of GENERAL MOTORS COMPANY

9. Disconnect the lower mount of the shock absorbers.

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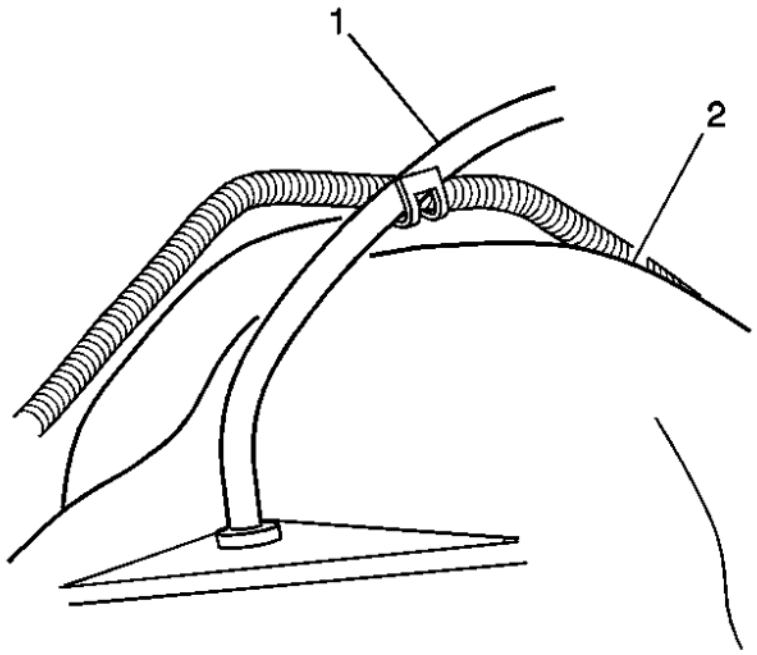


Fig. 171: Vent Hose And Rear Axle
Courtesy of GENERAL MOTORS COMPANY

10. Disconnect the vent hose (1).
11. Disconnect the wheel speed sensors. Refer to **Rear Wheel Speed Sensor Replacement** .
12. Disconnect the park brake cables. Refer to **Parking Brake Rear Cable Replacement - Left Side (J95)** **Parking Brake Rear Cable Replacement - Left Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Left Side (JD9 With J71)** , and **Parking Brake Rear Cable Replacement - Right Side (J95)** **Parking Brake Rear Cable Replacement - Right Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Right Side (JD9 With J71)** .

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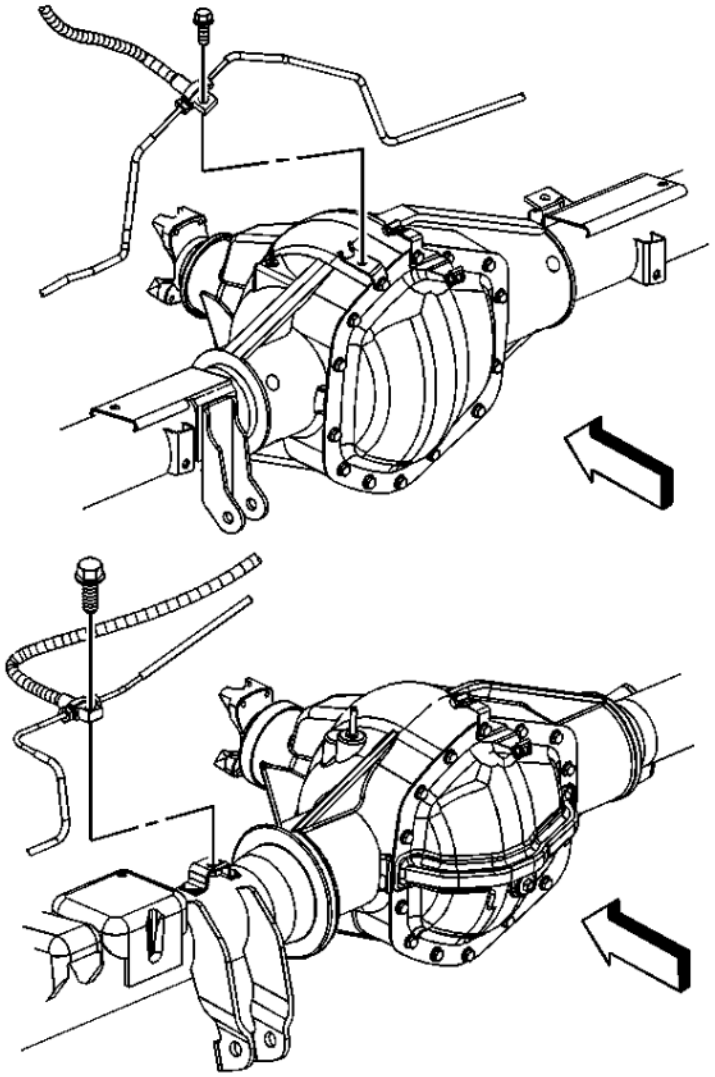


Fig. 172: Disconnecting Junction Block
Courtesy of GENERAL MOTORS COMPANY

13. Disconnect the junction block.

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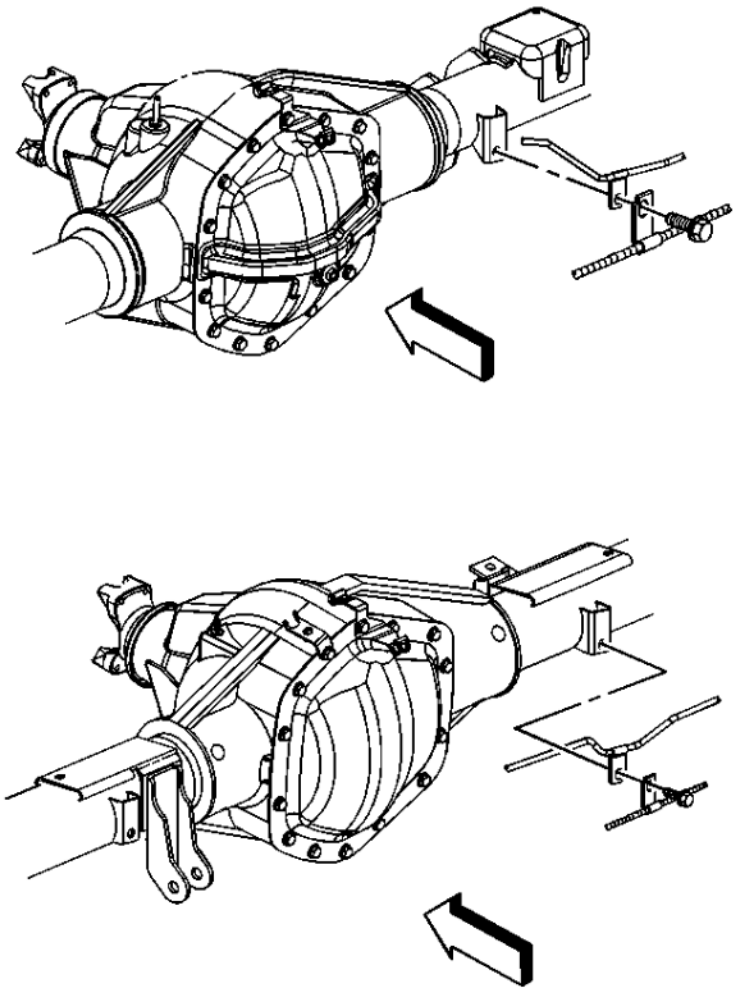


Fig. 173: Disconnecting Brake Pipe
Courtesy of GENERAL MOTORS COMPANY

14. Disconnect the brake pipe.

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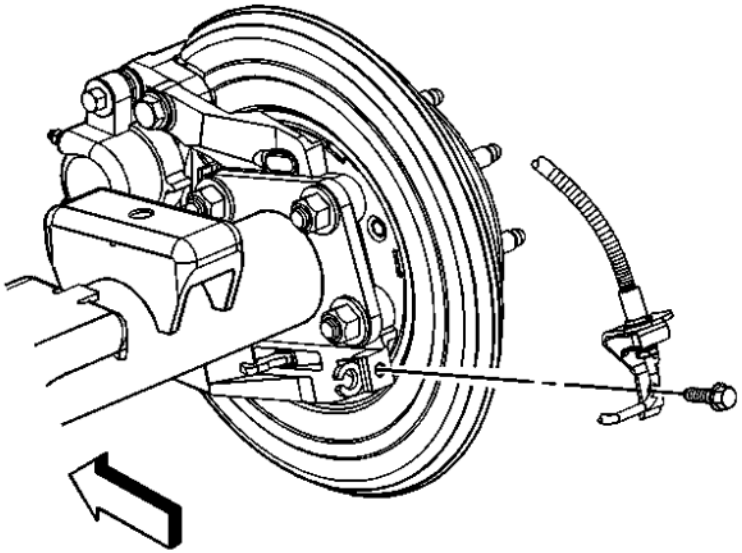


Fig. 174: Disconnecting Brake Pipe Fitting Bracket From Brake Assembly
Courtesy of GENERAL MOTORS COMPANY

15. Disconnect the brake pipe fitting bracket from the brake assembly.
16. Remove the brake calipers. Refer to **Rear Brake Caliper Replacement (JD9)** **Rear Brake Caliper Replacement (J95)** .

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

17. Support the calipers from the frame using a heavy gauge mechanics wire.

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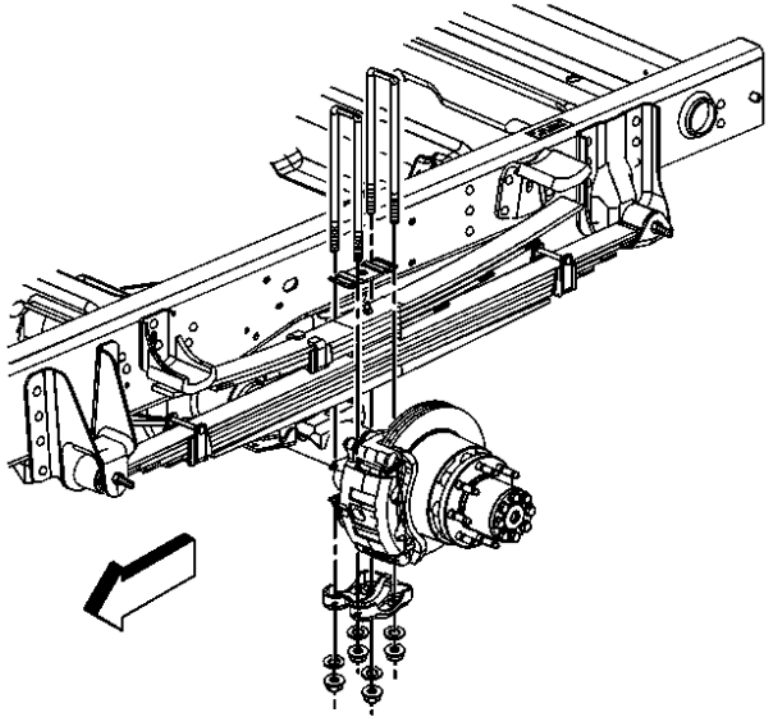


Fig. 175: Removing U-Bolts
Courtesy of GENERAL MOTORS COMPANY

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

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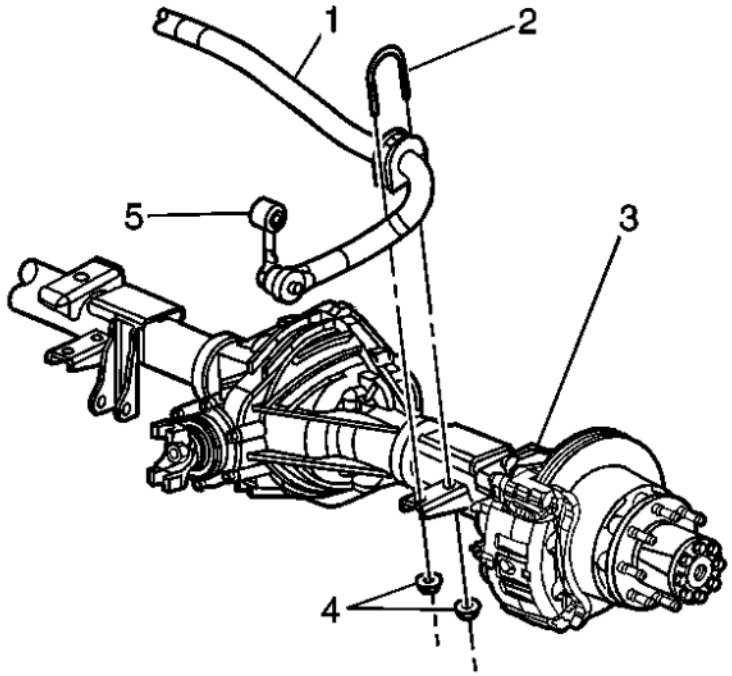


Fig. 176: Stabilizer Shaft, U-Bolts, Nuts & Axle
Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

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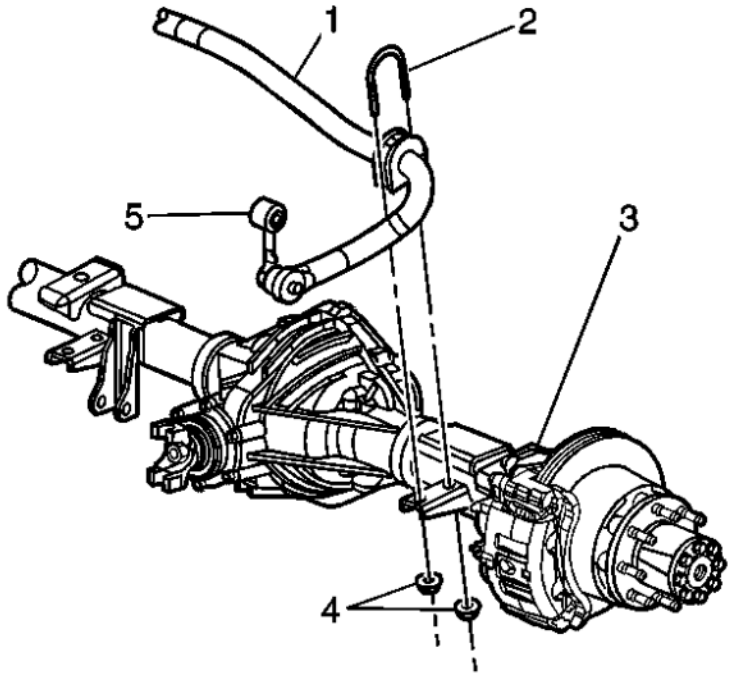


Fig. 177: Stabilizer Shaft, U-Bolts, Nuts & Axle
Courtesy of GENERAL MOTORS COMPANY

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

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

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

   Align the axle with the springs.

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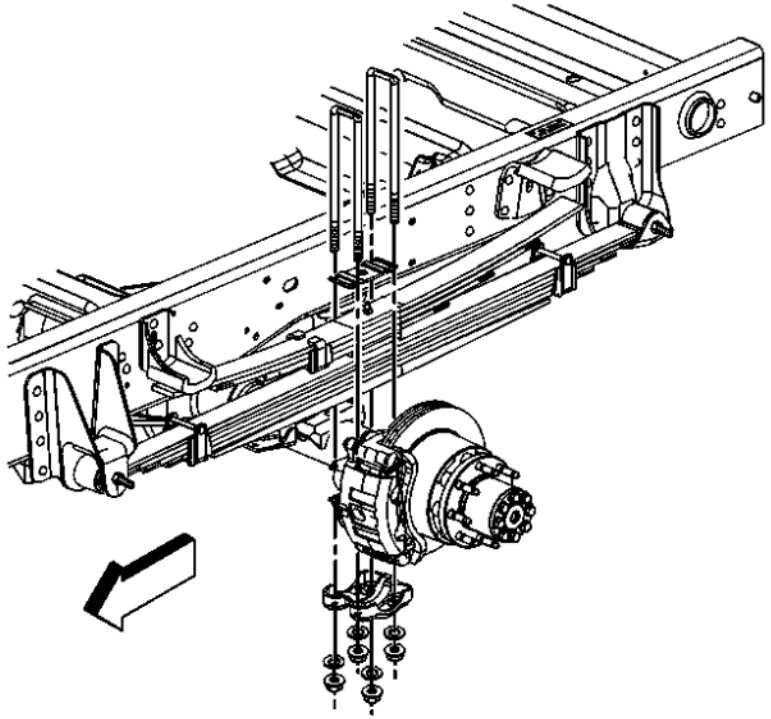


Fig. 178: Installing U-Bolts
Courtesy of GENERAL MOTORS COMPANY

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

CAUTION: **Refer to Fastener Caution .**

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

Tighten

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

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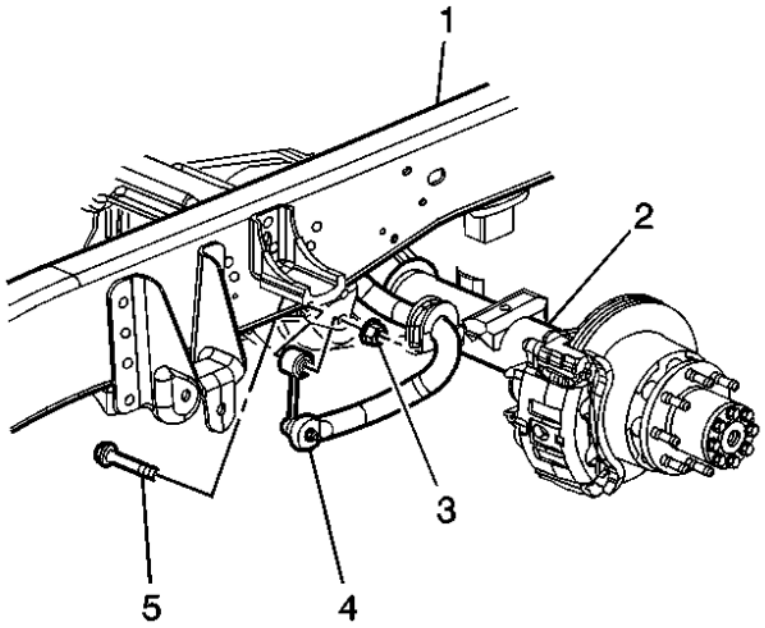


Fig. 179: Stabilizer Shaft Link, Bolt & Nut
Courtesy of GENERAL MOTORS COMPANY

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

Tighten

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

9. Install the brake calipers. Refer to **Rear Brake Caliper Replacement (JD9)** **Rear Brake Caliper Replacement (J95)** .

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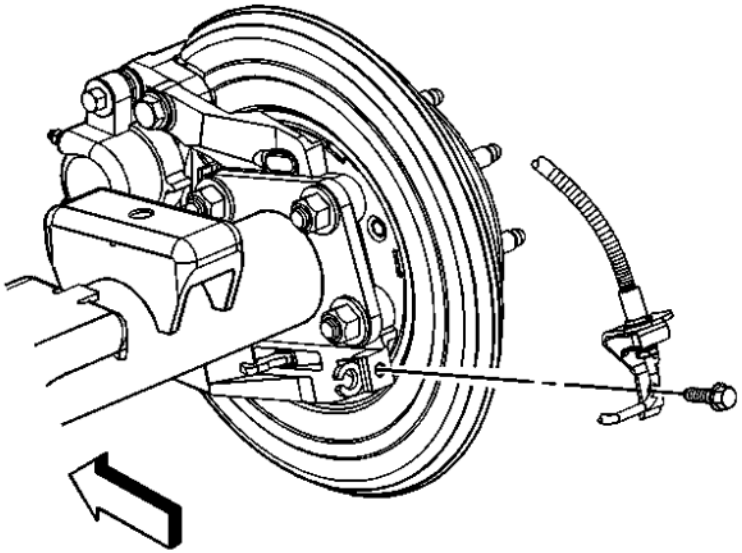


Fig. 180: Installing Brake Pipe Fitting Brackets
Courtesy of GENERAL MOTORS COMPANY

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

Tighten

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

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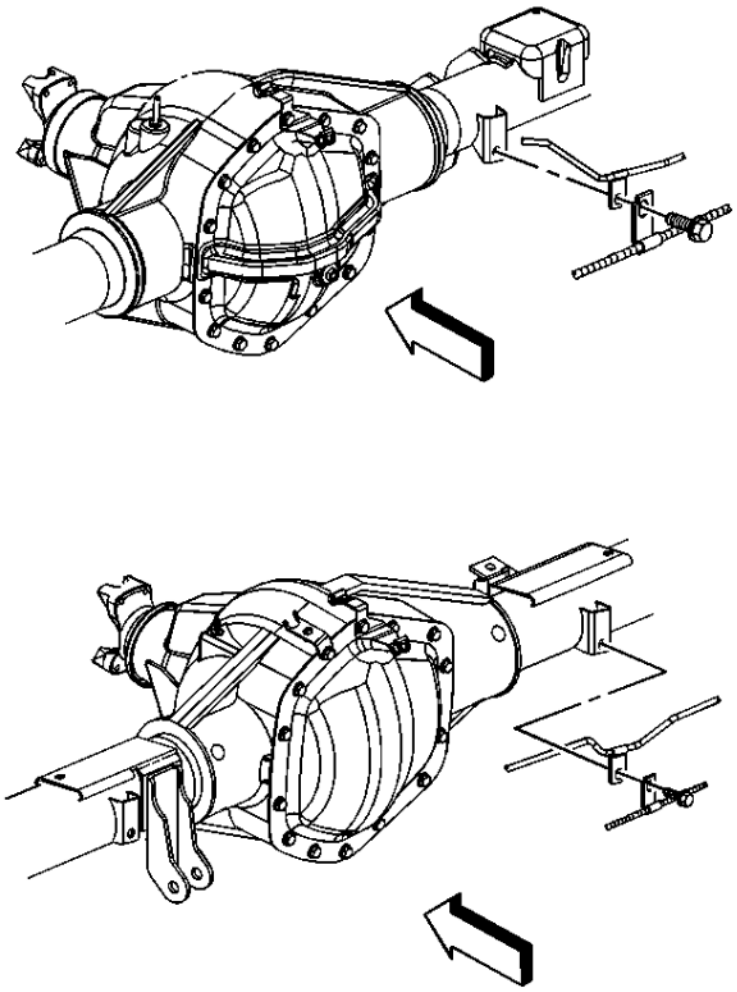


Fig. 181: Installing Brake Pipe
Courtesy of GENERAL MOTORS COMPANY

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

Tighten

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

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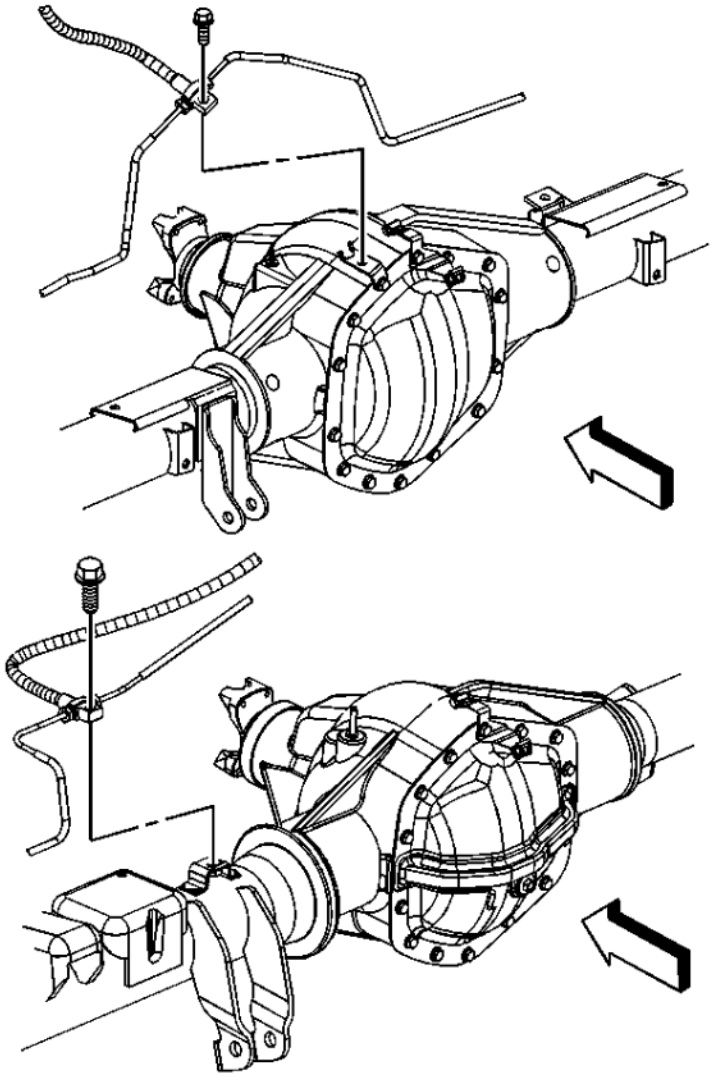


Fig. 182: Installing Brake Pipe Junction Block
Courtesy of GENERAL MOTORS COMPANY

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

Tighten

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

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16. Connect the park brake cables. Refer to **Parking Brake Rear Cable Replacement - Left Side (J95)** **Parking Brake Rear Cable Replacement - Left Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Left Side (JD9 With J71)** , and **Parking Brake Rear Cable Replacement - Right Side (J95)** **Parking Brake Rear Cable Replacement - Right Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Right Side (JD9 With J71)** .

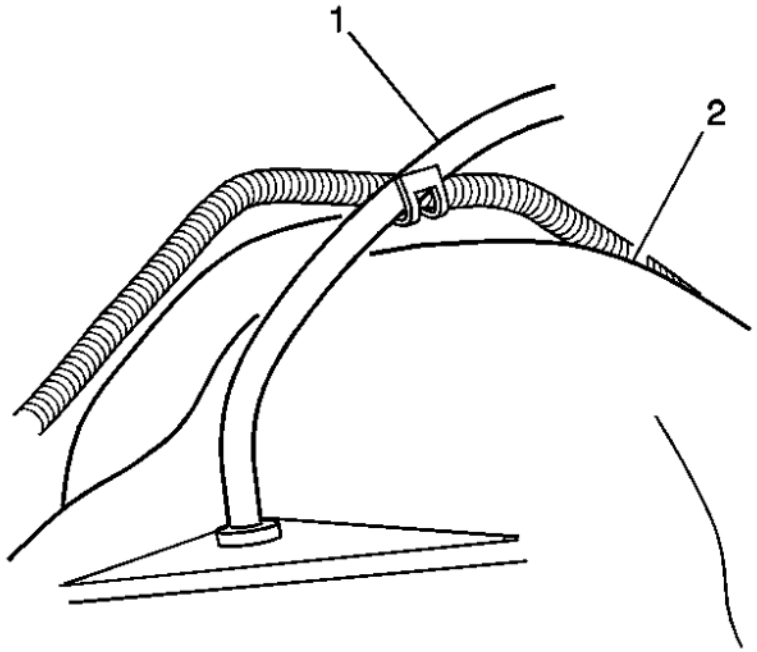


Fig. 183: Vent Hose And Rear Axle
Courtesy of GENERAL MOTORS COMPANY

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

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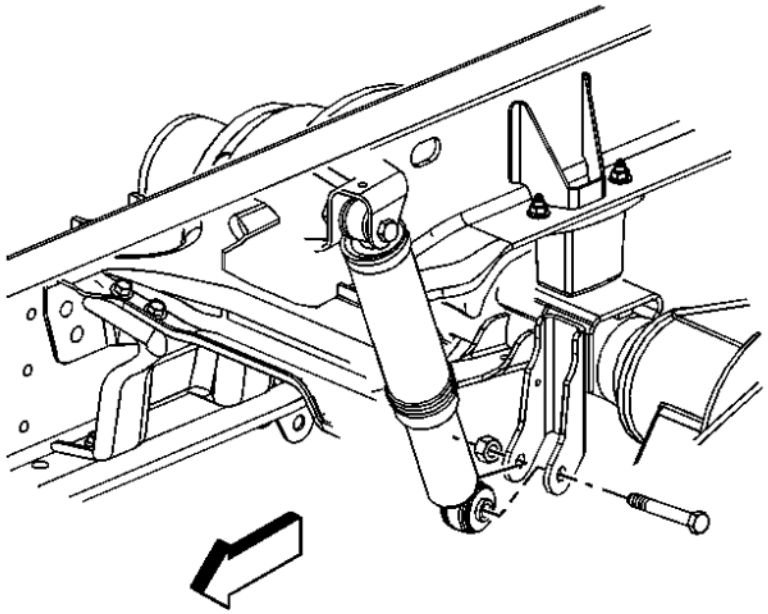


Fig. 184: Shock Absorber Lower Mount
Courtesy of GENERAL MOTORS COMPANY

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

Tighten

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

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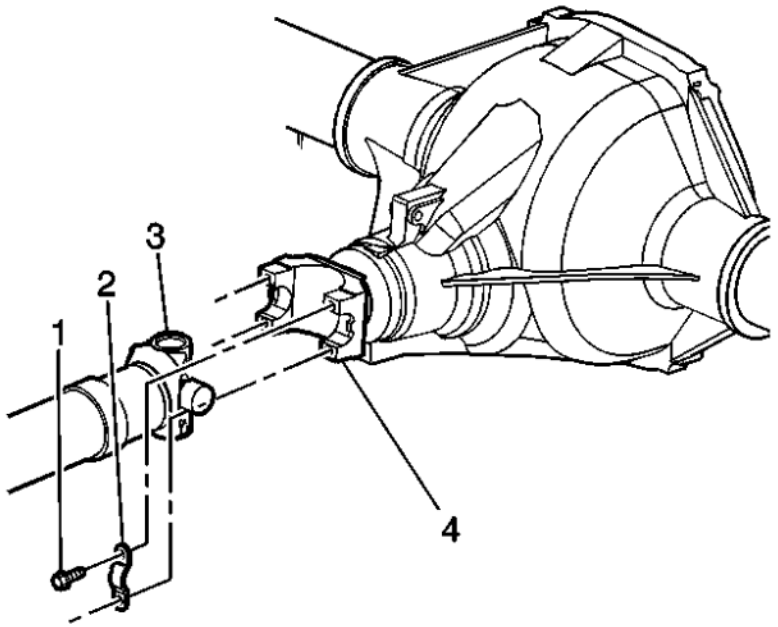


Fig. 185: Propeller Shaft, Rear Axle Pinion Yoke, Yoke Retainers And Bolts
Courtesy of GENERAL MOTORS COMPANY

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

    Align the reference marks made during removal.

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

    Tighten

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

22. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .
23. Fill the axle with lubricant. Use the proper fluid. Refer to **Approximate Fluid Capacities** , and **Fluid and Lubricant Recommendations** .
24. Remove the jack and utility stands.
25. Lower the vehicle.

REAR AXLE REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

Removal Procedure

1. If equipped with J71, release the park brake tension. Refer to **Parking Brake Cable Adjuster Disabling (Without J71)** **Parking Brake Cable Adjuster Disabling (With J71)** .

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2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Remove the rear tires and wheels. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .

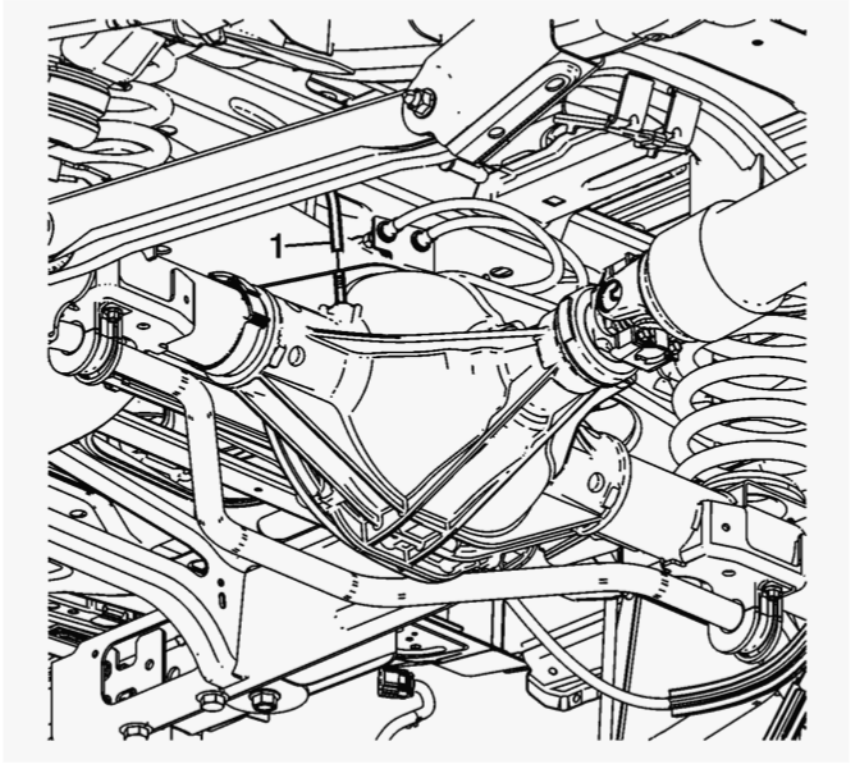


Fig. 186: Vent Hose And Rear Drive Axle
Courtesy of GENERAL MOTORS COMPANY

4. Remove the vent hose (1) from the rear drive axle.
5. Remove the electronic suspension control sensor, if equipped.
   - For the left side, refer to **Electronic Suspension Rear Position Sensor Replacement - Left Side** .
   - For the right side, refer to **Electronic Suspension Rear Position Sensor Replacement - Right Side** .
6. Remove the rear wheel speed sensors from the rear drive axle. Refer to **Rear Wheel Speed Sensor Replacement** .
7. Remove the rear brake calipers, and relocate to the side. Refer to **Rear Brake Caliper Replacement (JD9)** **Rear Brake Caliper Replacement (J95)** .
8. Drain the rear axle. Refer to **Differential Oil Replacement (8.6 Inch Axle)** **Differential Oil Replacement (9.5/9.76 Inch Axle)** .
9. Remove the propeller shaft. Refer to **Rear Propeller Shaft Replacement (1500)** **Rear Propeller Shaft Replacement (Heavy Duty)** **Rear Propeller Shaft Replacement (M5U, 2WD)** .

NOTE: **The stabilizer shaft links do not have removed in the following procedure. Rotate the links upward toward the frame and of the way.**

10. Remove the rear stabilizer shaft, if equipped. Refer to **Stabilizer Shaft Replacement** .
11. Remove the rear axle lateral link. Refer to **Rear Suspension Lateral Link Replacement** .

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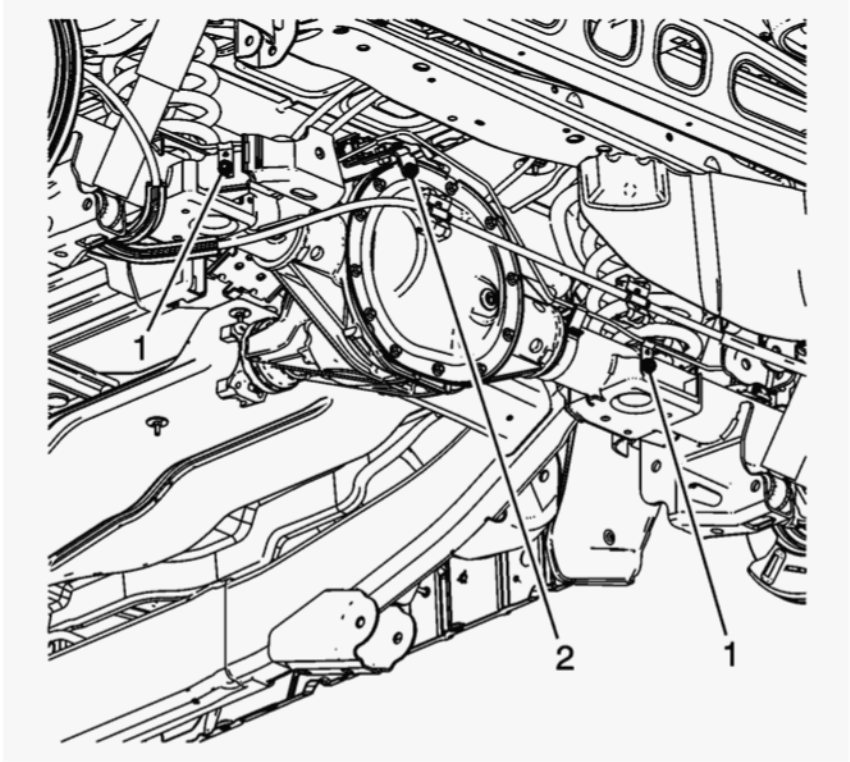


Fig. 187: Rear Brake Pipe Retaining Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

12. Remove the rear brake pipe retaining bracket bolt (1).
13. Remove the rear brake junction block retaining bolt (2) at the rear axle cover.
14. Secure the rear brake pipes to the frame with mechanics wire or equivalent.

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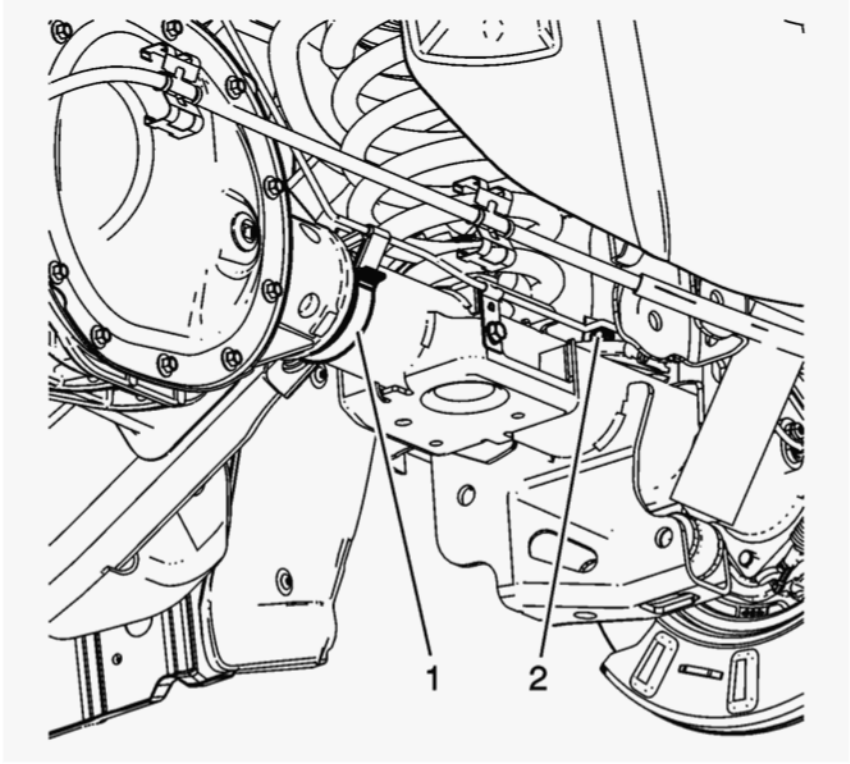


Fig. 188: Rear Brake Pipe And Retaining Strap
Courtesy of GENERAL MOTORS COMPANY

15. Remove the rear brake pipe from the retaining strap (1).
16. Remove the brake pipe retaining bracket bolt (2).

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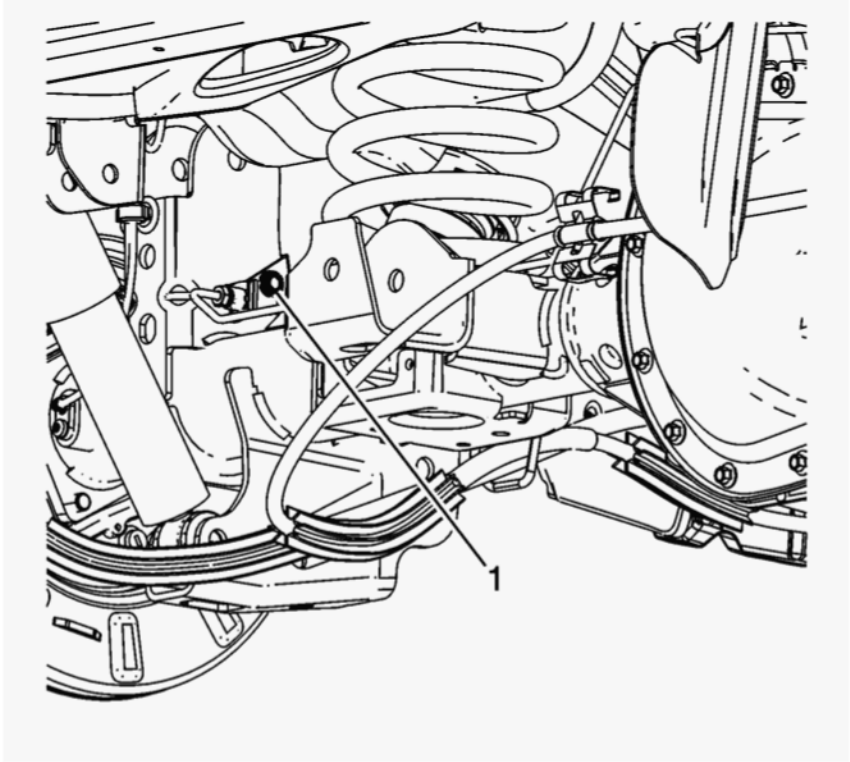


Fig. 189: Brake Pipe Retaining Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

17. Remove the brake pipe retaining bracket bolt from the other side (1).
18. If the vehicle is not equipped with J71, disable the parking brake cables. Refer to **Parking Brake Cable Adjuster Disabling (Without J71)** .
19. Disconnect the rear parking brake cables from the parking brake actuator levers on both sides. Refer to **Parking Brake Rear Cable Replacement - Left Side (J95)** **Parking Brake Rear Cable Replacement - Left Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Left Side (JD9 With J71)** , or **Parking Brake Rear Cable Replacement - Right Side (J95)** **Parking Brake Rear Cable Replacement - Right Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Right Side (JD9 With J71)** .
20. Release both parking brake cables from the rear brake anchor plates. Refer to **Parking Brake Rear Cable Replacement - Left Side (J95)** **Parking Brake Rear Cable Replacement - Left Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Left Side (JD9 With J71)** , or **Parking Brake Rear Cable Replacement - Right Side (J95)** **Parking Brake Rear Cable Replacement - Right Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Right Side (JD9 With J71)** .

NOTE: **Ensure that the rear drive axle is properly secured to the jack stand.**

21. Support the rear drive axle with a hydraulic jack stand.

NOTE: **In steps 17 and 18, it is not necessary to remove the control arms. Secure the control arms to the frame with the use of mechanics wire or equivalent.**

22. Remove the lower control arm bolts from the rear the drive axle. Refer to **Lower Control Arm Replacement** .
23. Remove the upper trailing link bolts from the rear drive axle. Refer to **Rear Suspension Upper Trailing Link Replacement** .
24. With the aid of an assistant, lower the drive axle.
25. Remove the rear coil springs.

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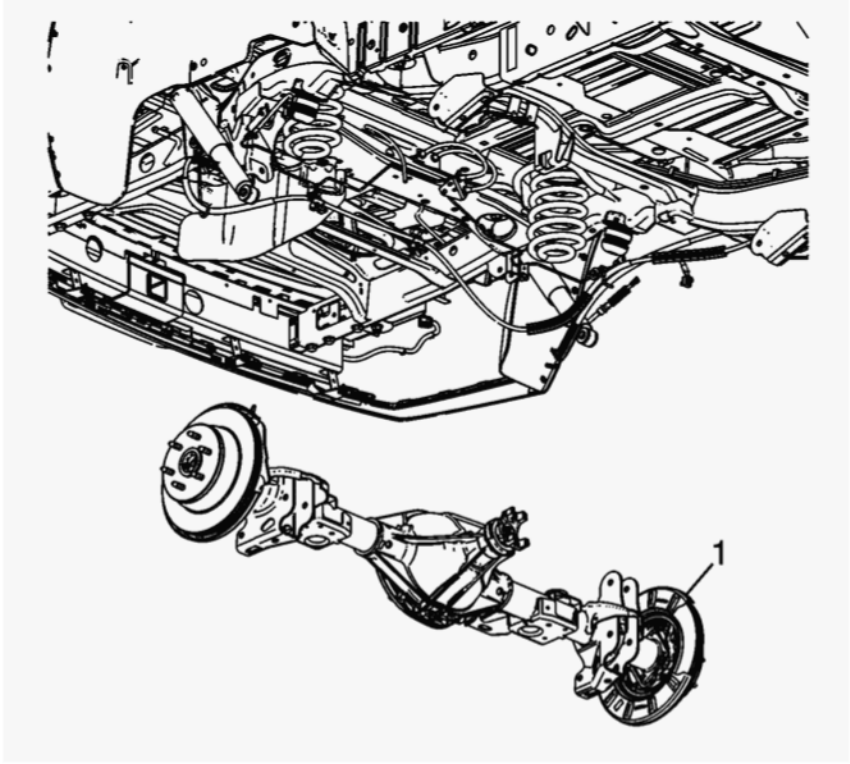


Fig. 190: Rear Drive Axle Assembly
Courtesy of GENERAL MOTORS COMPANY

26. Lower the rear drive axle assembly.
27. Transfer parts, if needed.

Installation Procedure

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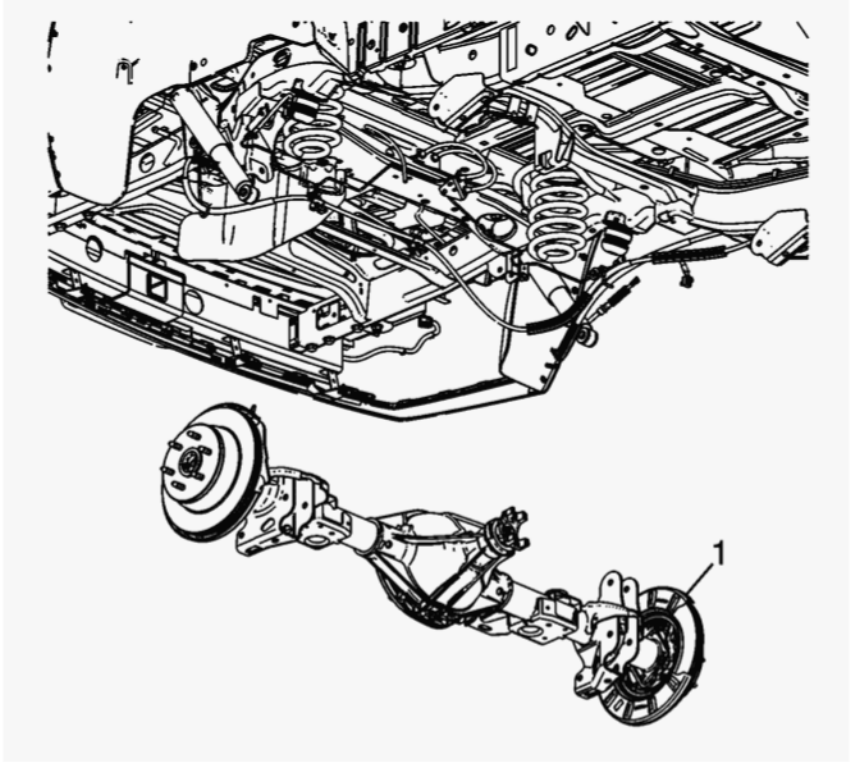


Fig. 191: Rear Drive Axle Assembly
Courtesy of GENERAL MOTORS COMPANY

1. Position the rear drive axle assembly under the vehicle.
2. With the aide of an assistant, raise the rear drive axle into place.
3. Install the rear coil springs on the rear drive axle.
4. Install the upper trailing links to the rear drive axle. Refer to **Rear Suspension Upper Trailing Link Replacement** .
5. Install the lower control arms to the rear drive axle. Refer to **Lower Control Arm Replacement** .
6. Install the lower shock absorber bolts to the rear drive axle. Refer to **Shock Absorber Replacement (Z56, Z71, ZW7)** **Shock Absorber Replacement (Heavy Duty)** .
7. Remove the hydraulic jack stand from the rear drive axle assembly.

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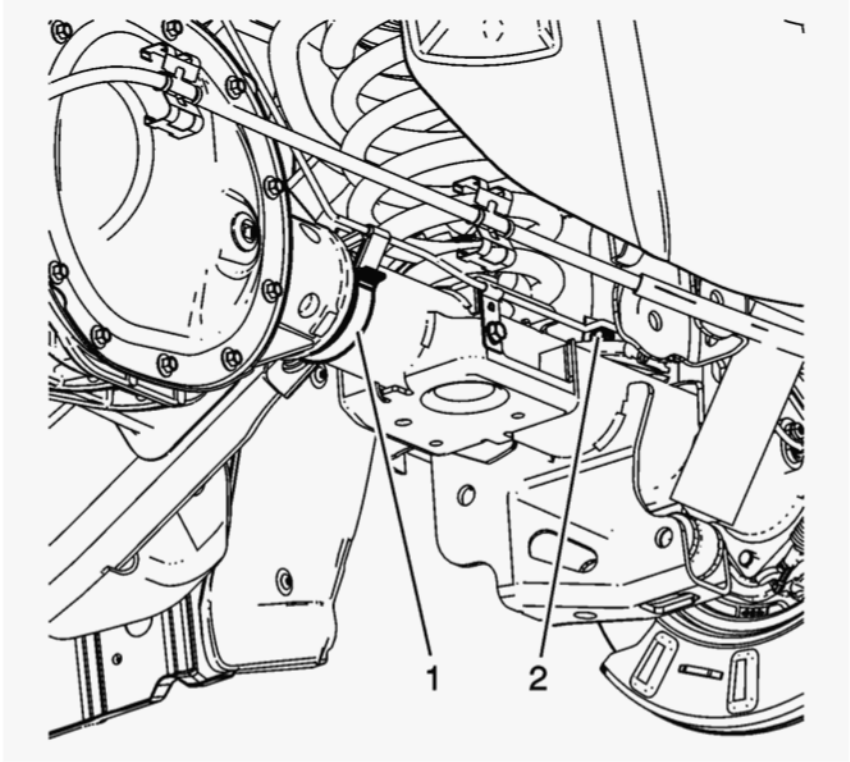


Fig. 192: Rear Brake Pipe And Retaining Strap
Courtesy of GENERAL MOTORS COMPANY

8. Install the rear brake pipe to the retaining strap (1).
9. Install the brake pipe retaining bracket bolt (2).
10. Install both parking brake cables to the rear brake anchor plates. Refer to **Parking Brake Rear Cable Replacement - Left Side (J95)** **Parking Brake Rear Cable Replacement - Left Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Left Side (JD9 With J71)** , or **Parking Brake Rear Cable Replacement - Right Side (J95)** **Parking Brake Rear Cable Replacement - Right Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Right Side (JD9 With J71)** .
11. Connect the rear parking brake cables from the parking brake actuator levers on both sides. Refer to **Parking Brake Rear Cable Replacement - Left Side (J95)** **Parking Brake Rear Cable Replacement - Left Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Left Side (JD9 With J71)** , or **Parking Brake Rear Cable Replacement - Right Side (J95)** **Parking Brake Rear Cable Replacement - Right Side (JD9 Without J71)** **Parking Brake Rear Cable Replacement - Right Side (JD9 With J71)** .

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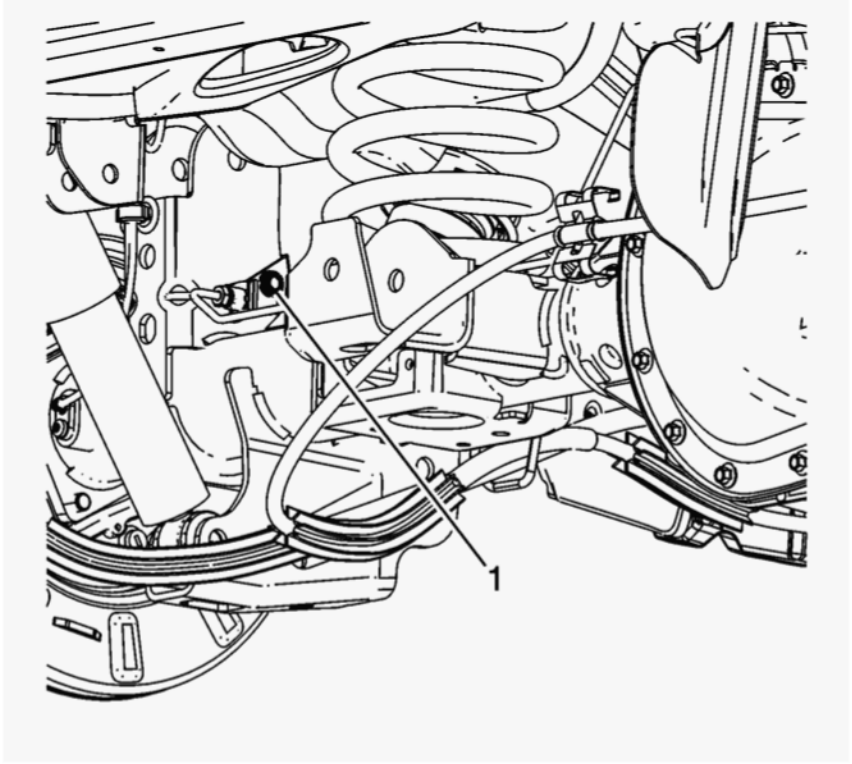


Fig. 193: Brake Pipe Retaining Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

12. Install the brake pipe retaining bracket bolt to the other side (1).

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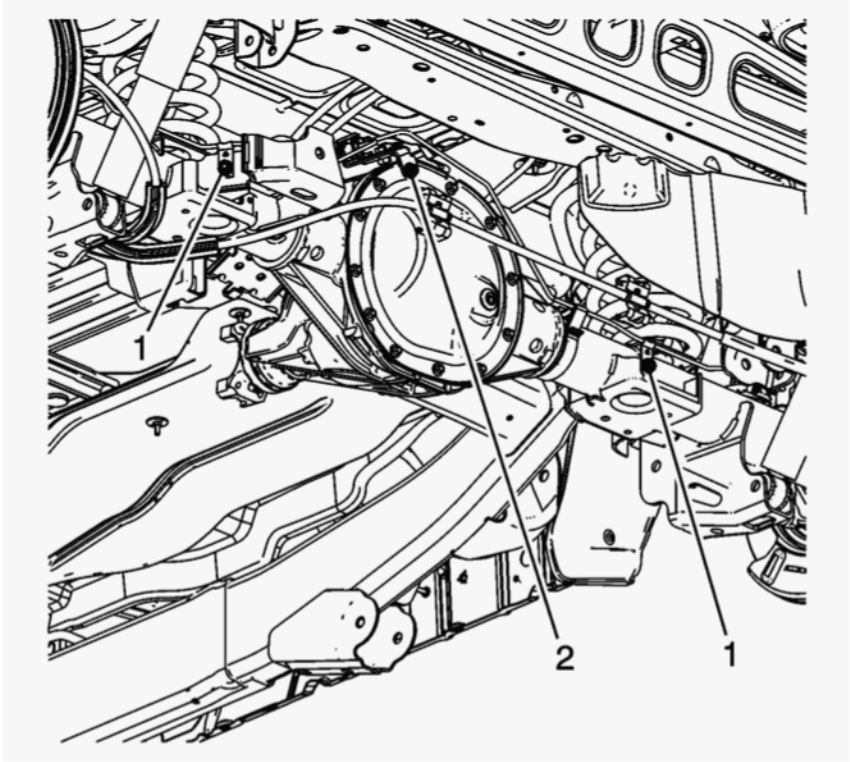


Fig. 194: Rear Brake Pipe Retaining Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

13. Install the rear brake pipe retaining bracket bolt (1) and tighten to 20 N.m (15 lb ft).
14. Install the rear brake junction block retaining bolt (2) at the rear axle cover and tighten to 20 N.m (15 lb ft).

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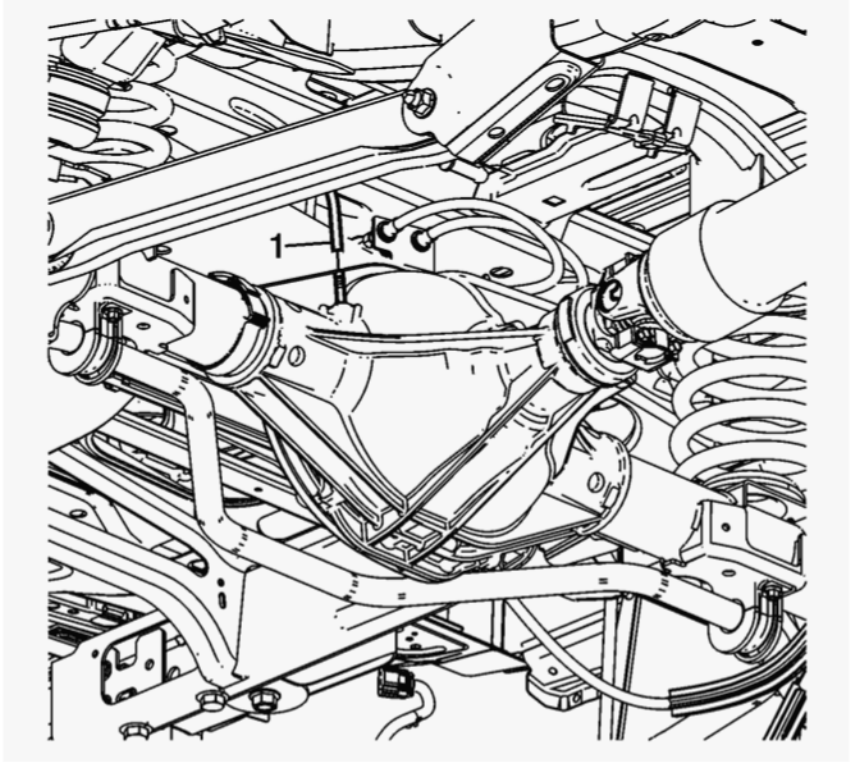


Fig. 195: Vent Hose And Rear Drive Axle
Courtesy of GENERAL MOTORS COMPANY

15. Install rear drive axle the vent hose.
16. Install the rear wheel speed sensors. Refer to **Rear Wheel Speed Sensor Replacement** .
17. Install the rear axle lateral link. Refer to **Rear Suspension Lateral Link Replacement** .

NOTE: **Rotate the stabilizer shaft links down into position to install them.**

18. Install the rear stabilizer shaft, if equipped. Refer to **Stabilizer Shaft Replacement** .
19. Install the rear brake calipers. Refer to **Rear Brake Caliper Replacement (JD9)** **Rear Brake Caliper Replacement (J95)** .
20. Install the rear propeller shaft. Refer to **Rear Propeller Shaft Replacement (1500)** **Rear Propeller Shaft Replacement (Heavy Duty)** **Rear Propeller Shaft Replacement (M5U, 2WD)** .
21. Install the air level sensors.
    - For the left side, refer to **Electronic Suspension Rear Position Sensor Replacement - Left Side** .
    - For the right side, refer to **Electronic Suspension Rear Position Sensor Replacement - Right Side** .
22. Fill the rear drive axle with fluid. Refer to **Differential Oil Replacement (8.6 Inch Axle)** **Differential Oil Replacement (9.5/9.76 Inch Axle)** .
23. Install the rear tires and wheels. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .
24. Remove the supports and lower the vehicle.
25. Calibrate the air level control, if needed. Refer to **Suspension Position Calibration (With Z95)** **Suspension Position Calibration (With Z85)** .

REAR AXLE HOUSING REPLACEMENT

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Removal Procedure

1. Remove the rear axle. Refer to **Rear Axle Replacement (10.5 Inch Axle)Rear Axle Replacement (8.6/9.5/9.76 Inch Axles)**.
2. Remove the rear axle cover housing and gasket. Refer to **Rear Axle Housing Cover Gasket Replacement (8.6/9.5/9.76 Inch Axle)Rear Axle Housing Cover Gasket Replacement (10.5 Inch Axle)**.
3. Remove the rear wheel speed sensor. Refer to **Rear Wheel Speed Sensor Replacement** .
4. Remove the axle shafts. Refer to **Rear Axle Shaft Replacement**.

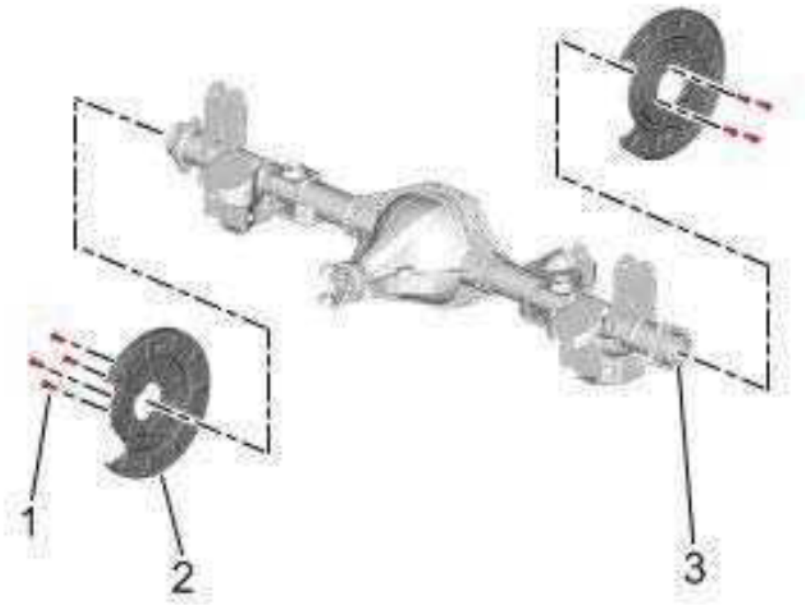


Fig. 196: Rear Brake Backing Plate
Courtesy of GENERAL MOTORS COMPANY

5. Remove the rear brake backing plate assembly bolts (1).
6. Remove the rear brake backing plate assemblies (2).
7. Remove the rear axle shaft oil seals and bearings (3). Refer to **Rear Axle Shaft Bearing Replacement**.
8. Remove the drive pinion shaft yoke and oil seal. Refer to **Differential Drive Pinion Gear Seal Replacement (8.6/9.5/9.76 Inch Axles)Differential Drive Pinion Gear Seal Replacement (10.5 Inch Axle)**.
9. Remove the differential assembly. Refer to **Differential Replacement (8.6/9.5/9.76 Inch Axles)Differential Replacement (10.5 Inch Axle)**.
10. Remove the drive pinion and the inner pinion bearing. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
11. Remove the pinion bearing cups. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle)**.
12. Remove the rear wheel speed sensor ring. Refer to **Wheel Speed Sensor Reluctor Ring Replacement** .

Installation Procedure

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1. Install the pinion bearing cups. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle)**.
2. Install the drive pinion oil seal. Refer to **Differential Drive Pinion Gear Seal Replacement (8.6/9.5/9.76 Inch Axles)Differential Drive Pinion Gear Seal Replacement (10.5 Inch Axle)**.
3. Determine the selective shim thickness for the drive pinion. Refer to **Pinion Depth Adjustment (8.6 Inch Axle)Pinion Depth Adjustment (10.5 Inch Axle)Pinion Depth Adjustment (9.5 Inch Axle)Pinion Depth Adjustment (9.76 Inch Axle)**.
4. Install the inner pinion bearing onto the drive pinion. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle)**.
5. Install the drive pinion. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
6. Install the pinion yoke. Refer to **Differential Drive Pinion Gear Seal Replacement (8.6/9.5/9.76 Inch Axles)Differential Drive Pinion Gear Seal Replacement (10.5 Inch Axle)**.
7. Install the differential assembly. Refer to **Differential Replacement (8.6/9.5/9.76 Inch Axles)Differential Replacement (10.5 Inch Axle)**.
8. Adjust the differential side bearing preload. Refer to **Differential Carrier Bearing Preload Adjustment (9.5/9.76 Inch Axle)Differential Carrier Bearing Preload Adjustment (8.6 Inch Axle)Differential Carrier Bearing Preload Adjustment (10.5 Inch Axle)**.
9. Adjust the drive pinion to ring gear backlash. Refer to **Backlash Adjustment (9.5/9.76 Inch Axle)Backlash Adjustment (8.6 Inch Axle)Backlash Adjustment (10.5 Inch Axle)**.
10. Perform a gear tooth contact pattern check. Refer to **Gear Tooth Contact Pattern Inspection**.

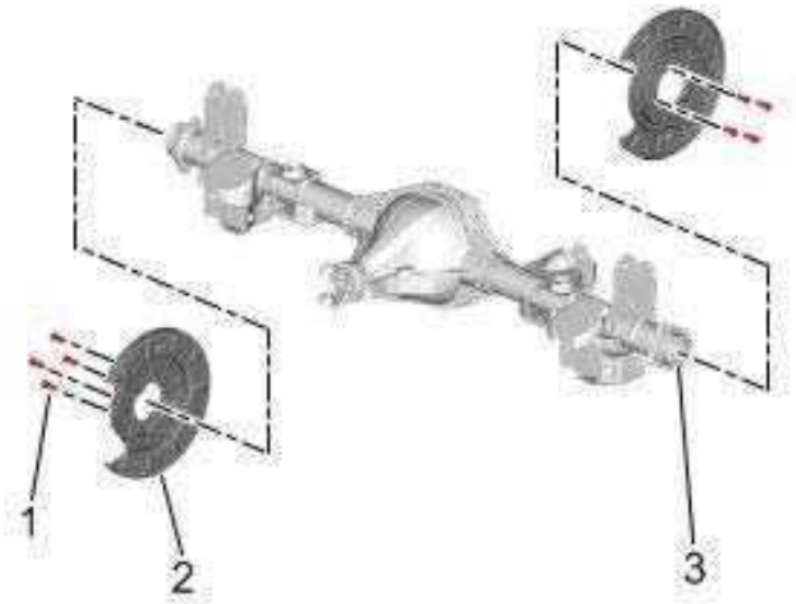


Fig. 197: Rear Brake Backing Plate
Courtesy of GENERAL MOTORS COMPANY

11. Install the rear axle shaft oil seals and bearings (3). Refer to **Rear Axle Shaft Bearing Replacement**.
12. Install the rear brake backing plate assemblies (2).

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CAUTION: Refer to **Fastener Caution** .

13. Install the rear brake backing plate assembly bolts (1) and tighten to 135 N.m (100 lb ft).
14. Install the axle shafts. Refer to **Rear Axle Shaft Replacement**.
15. Install the rear axle cover housing and gasket. Refer to **Rear Axle Housing Cover Gasket Replacement (8.6/9.5/9.76 Inch Axle)Rear Axle Housing Cover Gasket Replacement (10.5 Inch Axle)**.
16. Install the rear axle. Refer to **Rear Axle Replacement (10.5 Inch Axle)Rear Axle Replacement (8.6/9.5/9.76 Inch Axles)**.
17. Install the rear wheel speed sensor. Refer to **Rear Wheel Speed Sensor Replacement** .
18. Install the rear wheel speed sensor ring. Refer to **Wheel Speed Sensor Reluctor Ring Replacement** .

DIFFERENTIAL DRIVE PINION GEAR SEAL REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

Special Tools

- **J-8614-01** Flange Holder and Remover
- **J-38694** Pinion Oil Seal Installer
- **DT-50871** Pinion Oil Seal Installer

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

Removal Procedure

NOTE: **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 and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel)** .
3. Remove the rear disc brake rotor, if equipped. Refer to **Rear Brake Rotor Replacement (JD9) Rear Brake Rotor Replacement (J95)** .

NOTE: **Reference mark the rear propeller shaft to the rear axle pinion yoke.**

4. Remove the propeller shaft. Refer to: **Rear Propeller Shaft Replacement (1500) Rear Propeller Shaft Replacement (Heavy Duty) Rear Propeller Shaft Replacement (M5U, 2WD)** .

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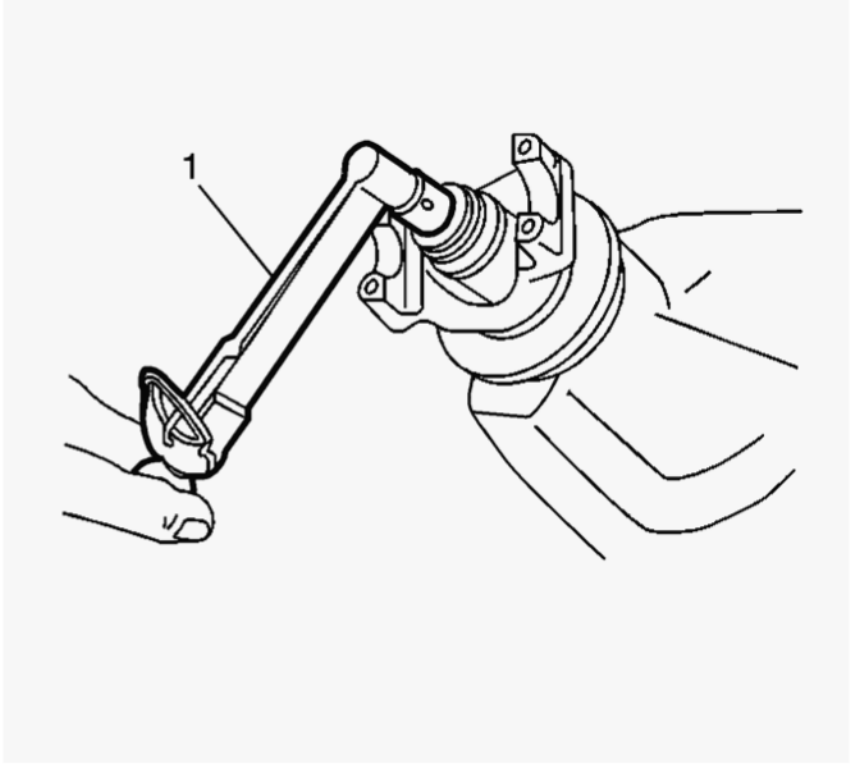


Fig. 198: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Record this measurement for reassembly.**

5. Using an inch-pound torque wrench, measure the rotational torque of the differential ring and pinion gear and related components.

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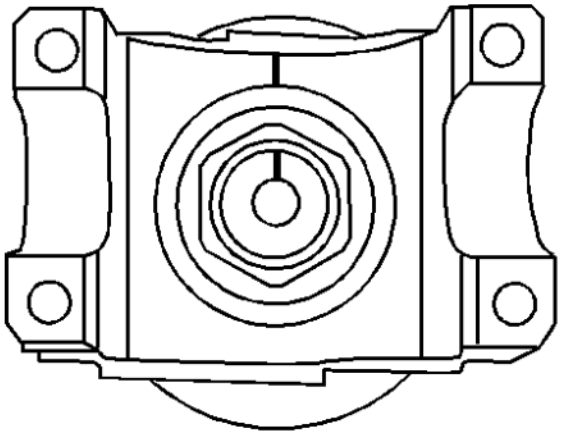


Fig. 199: Pinion Shaft And Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS COMPANY

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

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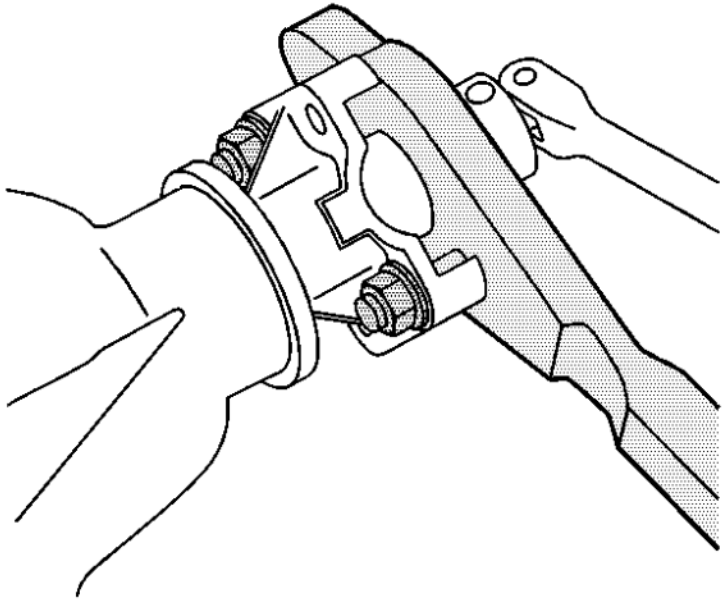


Fig. 200: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **DO NOT reuse the pinion nut, replace with NEW.**
- **9.5/9.76 axle pinion nut may require increased effort to break the nut staking loose before nut can be easily removed.**

7. Using the **J-8614-01** holder and remover or the J-34826 socket, remove and discard the pinion nut.

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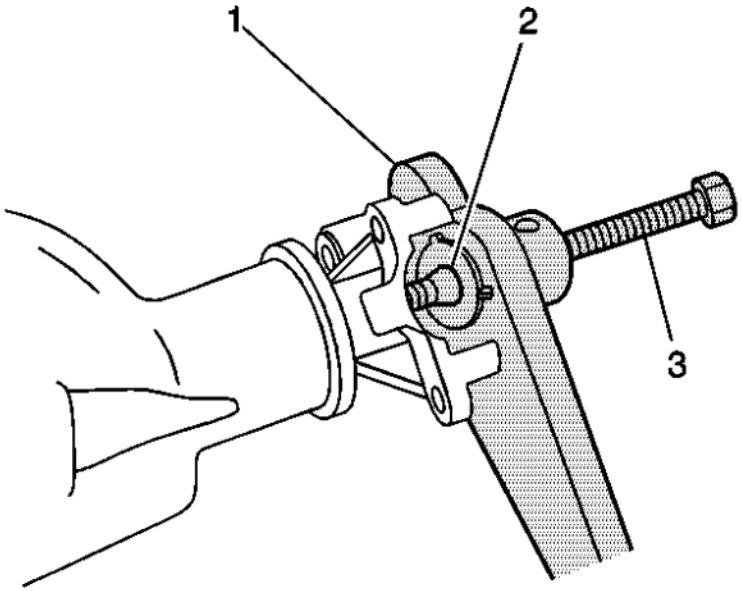


Fig. 201: Removing Pinion Yoke Using Special Tools
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Remove the pinion yoke by turning the J 8614-3 (3) clockwise.**

8. Using the J-8614-2 (2), J-8614-3 (3) and the **J-8614-01** remover (1), remove the pinion yoke.

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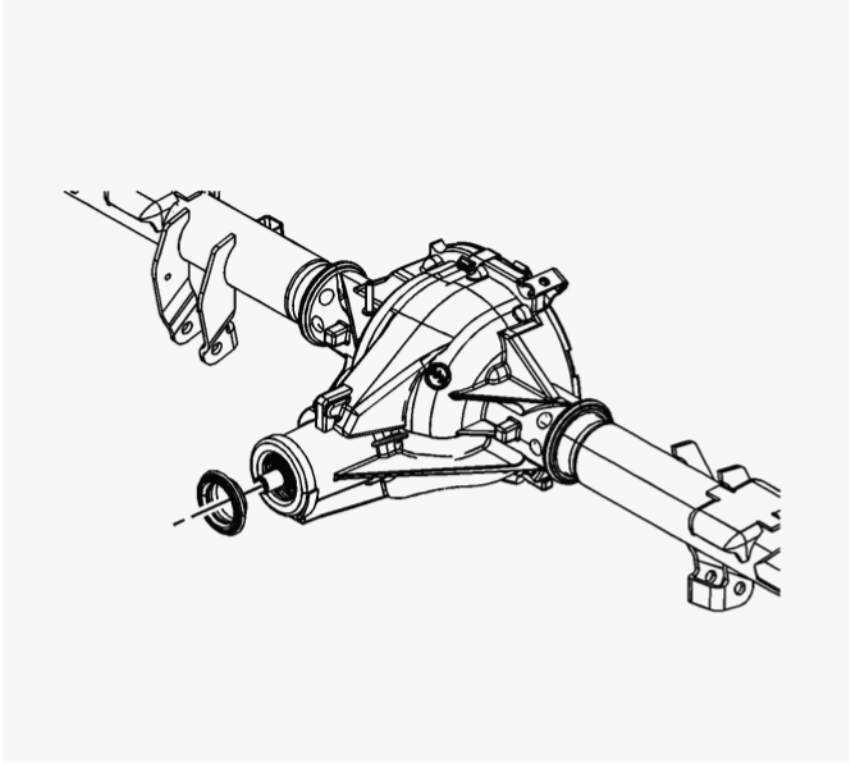


Fig. 202: Pinion Oil Seal
Courtesy of GENERAL MOTORS COMPANY

NOTE: **DO NOT damage the axle housing.**

9. Using a suitable tool, remove the pinion oil seal.

Installation Procedure

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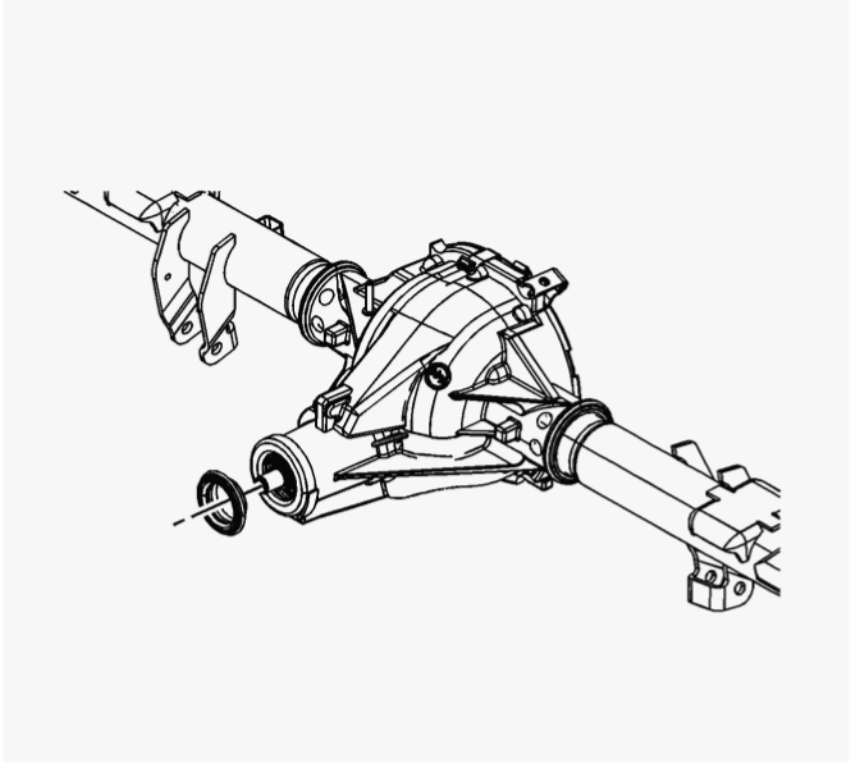


Fig. 203: Pinion Oil Seal
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Check pinion seal bore and inside of carrier to make sure both are clean and free of debris, corrosion, and/or burrs.**

1. Using the **J-38694** installer, 8.6 inch axle, or the **DT-50871** installer, 9.5/9.76 inch axle, install the new pinion oil seal.

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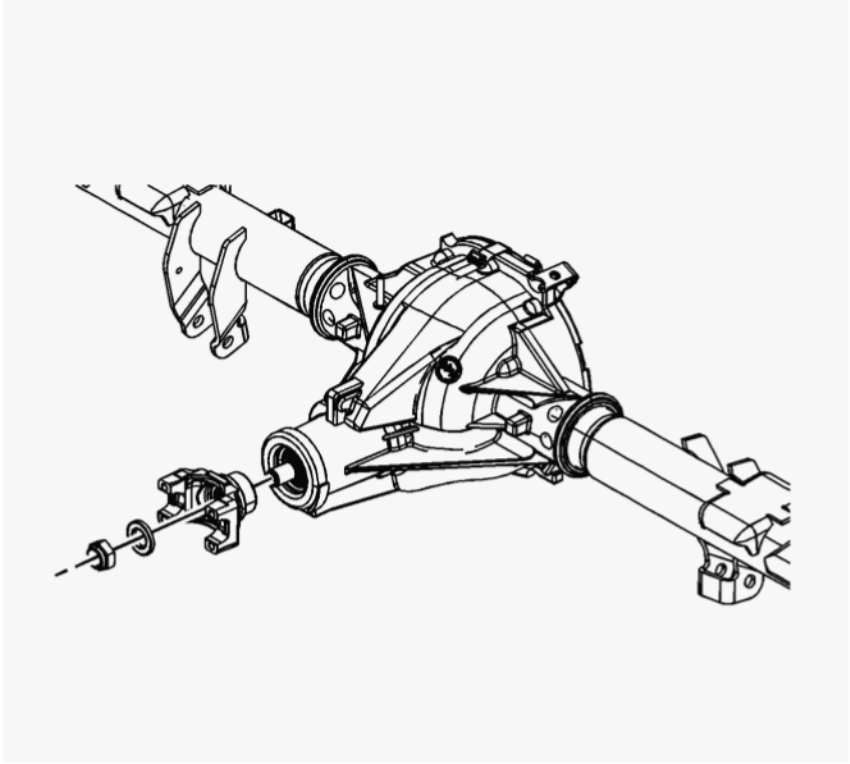


Fig. 204: Installing Pinion Yoke, Nut And Washer
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Do not apply excessive amounts of sealant to pinion yoke.**

2. Apply the proper sealant to the splines of the pinion yoke. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
3. Align the reference marks and install the pinion yoke.

CAUTION: **Refer to Pinion Flange/Yoke Installation Caution .**

4. Using a soft faced hammer, seat the pinion yoke onto the pinion shaft until a few threads are visible.
5. Install the washer (if applicable) and a NEW pinion nut.

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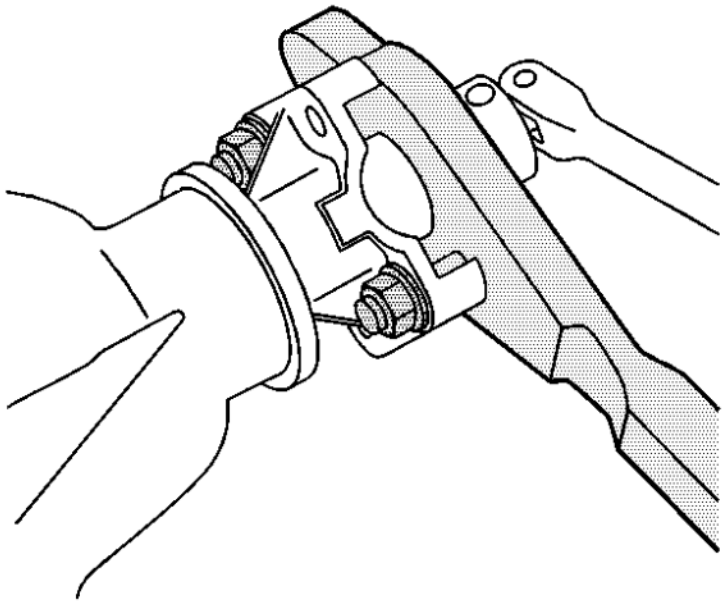


Fig. 205: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If the target rotating torque is exceeded during reassembly, the pinion flange assembly will have to be removed and a new collapsible spacer installed.**

6. Holding the **J-8614-01** holder, tighten the pinion nut until the pinion end play is just taken up.
7. Frequently rotate the pinion while tightening the nut to seat the bearings.

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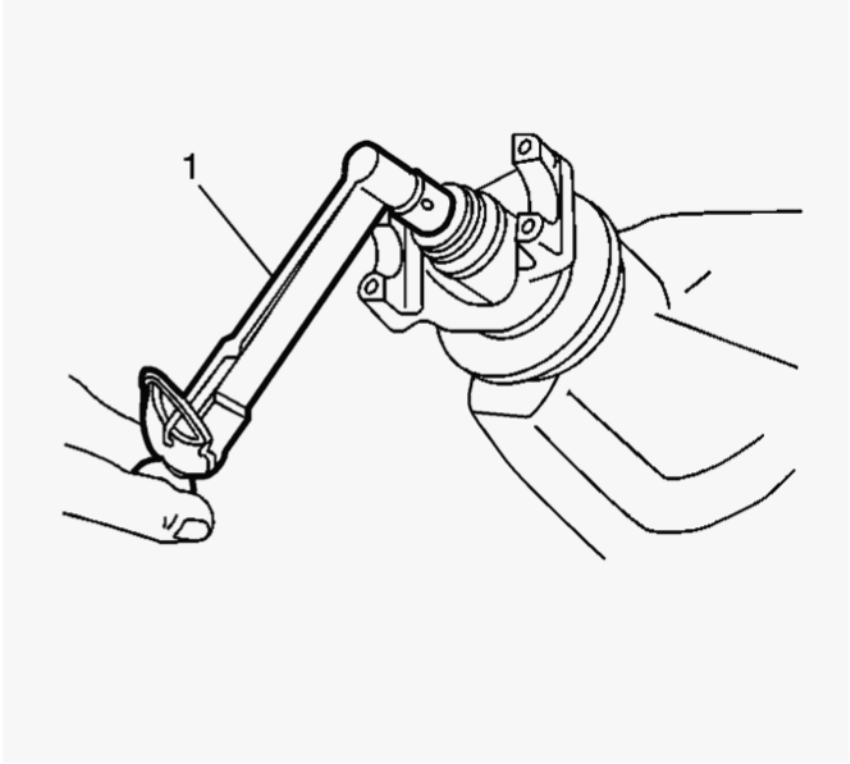


Fig. 206: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

NOTE: Compare this measurement with the rotating torque recorded during removal.

8. Using an inch pound torque wrench and tightening in small increments, measure the rotating torque of the pinion until the reading 0.40-0.57 N.m (3-5 lb in) greater than the rotational torque noted at removal.

NOTE:
- Recheck the rotating torque and adjust if necessary.
- 9.5 and 9.76 Axle - Use a hammer and punch to stake two sides of the drive pinion nut lip to the corresponding grooves in the drive pinion gear.
- Take care to not split the nut lip which could affect nut torque retention. If nut lip is split, use new nut.

9. Once the specified torque is obtained, rotate the pinion several times to seat the bearings.

NOTE: Realign the reference marks on the rear propeller shaft and the rear axle pinion yoke.

10. Install the propeller shaft. Refer to: Rear Propeller Shaft Replacement (1500) Rear Propeller Shaft Replacement (Heavy Duty) Rear Propeller Shaft Replacement (M5U, 2WD) .
11. Install the rear disc brake rotor, if equipped. Refer to Rear Brake Rotor Replacement (JD9) Rear Brake Rotor Replacement (J95) .
12. Install the rear tire and wheel assembly. Refer to Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel) .

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13. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Rear Axle Lubricant Level Inspection (8.6, 9.5/9.76 Inch Axle)**.
14. Remove the support and lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR SEAL REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **J-8614-01** Flange Holder and Remover
- **J-44414** Pinion Oil Seal Installer
- **J-34826** Hub Nut Socket - 36 mm

Equivalent regional tools: **Special Tools**

Removal Procedure

NOTE: **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 and support the vehicle. Refer to **Lifting and Jacking the Vehicle**
2. Remove the rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)**
3. Remove the rear disc brake rotor, if equipped. Refer to **Rear Brake Rotor Replacement (JD9)** **Rear Brake Rotor Replacement (J95)**
4. Remove the rear axle shafts. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**

NOTE: **Reference mark the rear propeller shaft to the rear axle pinion yoke.**

5. Remove the propeller shaft. Refer to **Rear Propeller Shaft Replacement (Heavy Duty)** **Rear Propeller Shaft Replacement (M5U, 2WD)**

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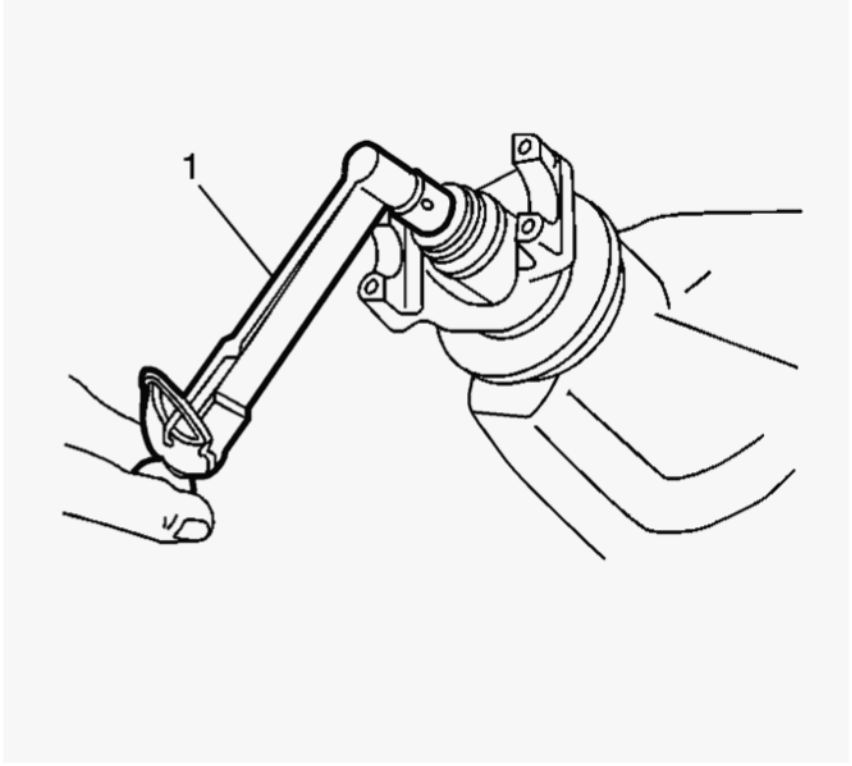


Fig. 207: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Record this measurement for reassembly.**

6. Using an inch-pound torque wrench, measure the rotational torque of the differential ring and pinion gear and related components.

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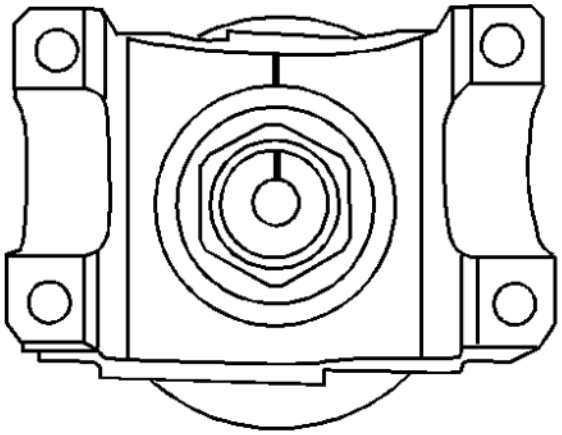


Fig. 208: Pinion Shaft And Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS COMPANY

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

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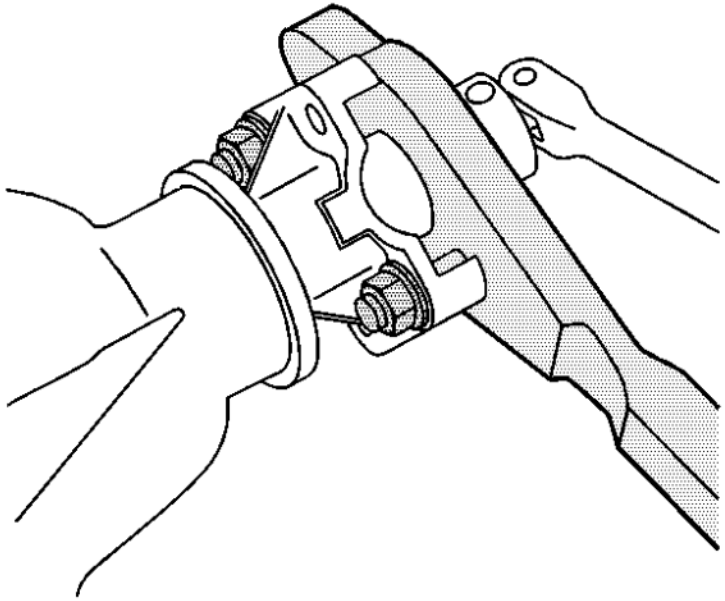


Fig. 209: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **DO NOT reuse the pinion nut, replace with NEW.**
- **For the 11.5 inch axle, use J-34826 socket.**

8. Using the **J-8614-01** holder and remover or the **J-34826** socket, remove and discard the pinion the pinion nut.

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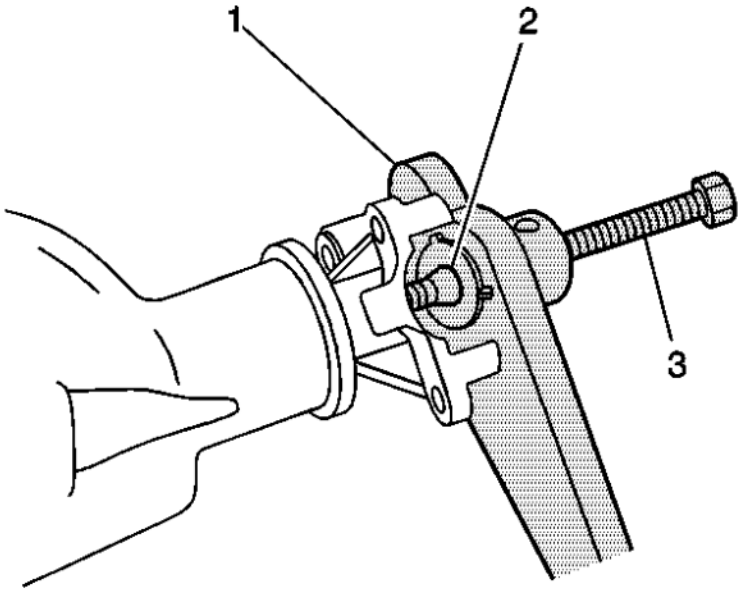


Fig. 210: Removing Pinion Yoke Using Special Tools
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Remove the pinion yoke by turning the J-8614-3 (3) clockwise.**

9. Using the **J-8614-2** (2), **J-8614-3** (3) and the **J-8614-01** remover (1), remove the pinion yoke.

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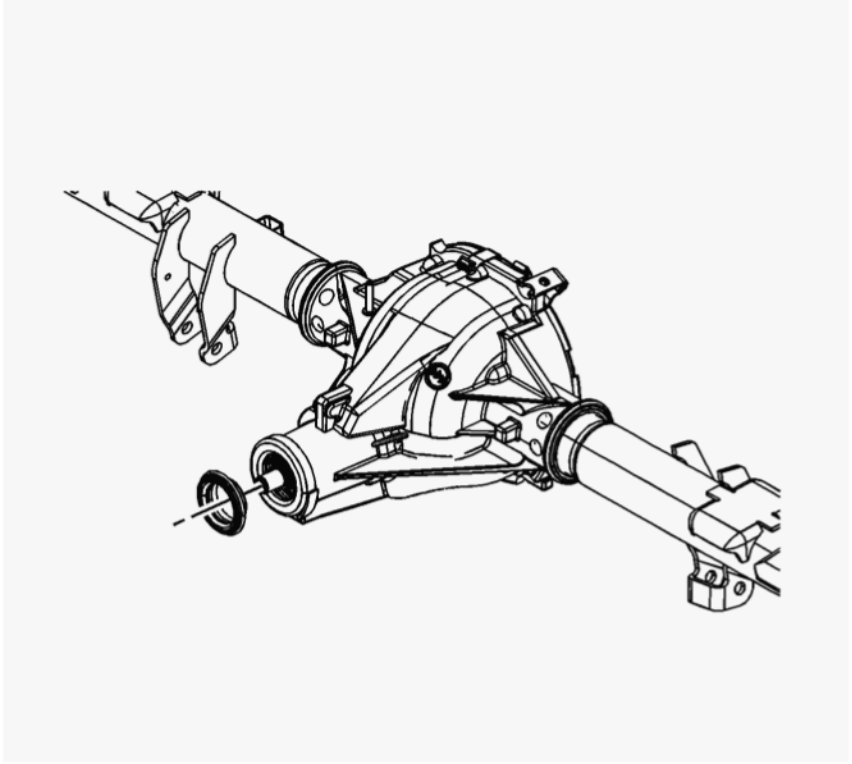


Fig. 211: Pinion Oil Seal
Courtesy of GENERAL MOTORS COMPANY

NOTE: **DO NOT damage the axle housing.**

10. Using a suitable tool, remove the pinion oil seal.

Installation Procedure

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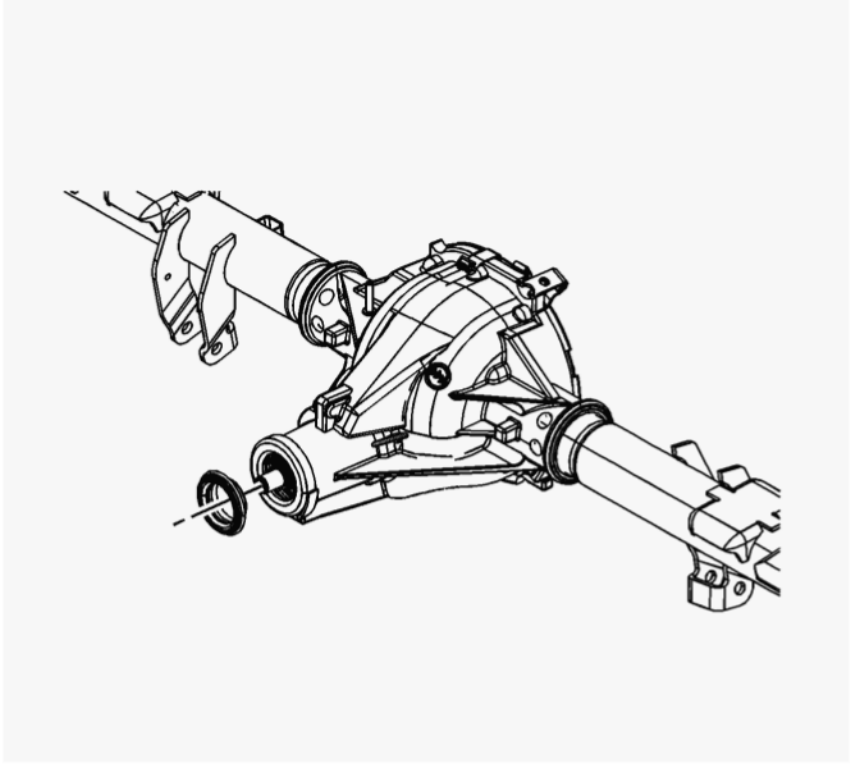


Fig. 212: Pinion Oil Seal
Courtesy of GENERAL MOTORS COMPANY

1. Using the **J-44414** pinion oil seal installer, install the new pinion oil seal.

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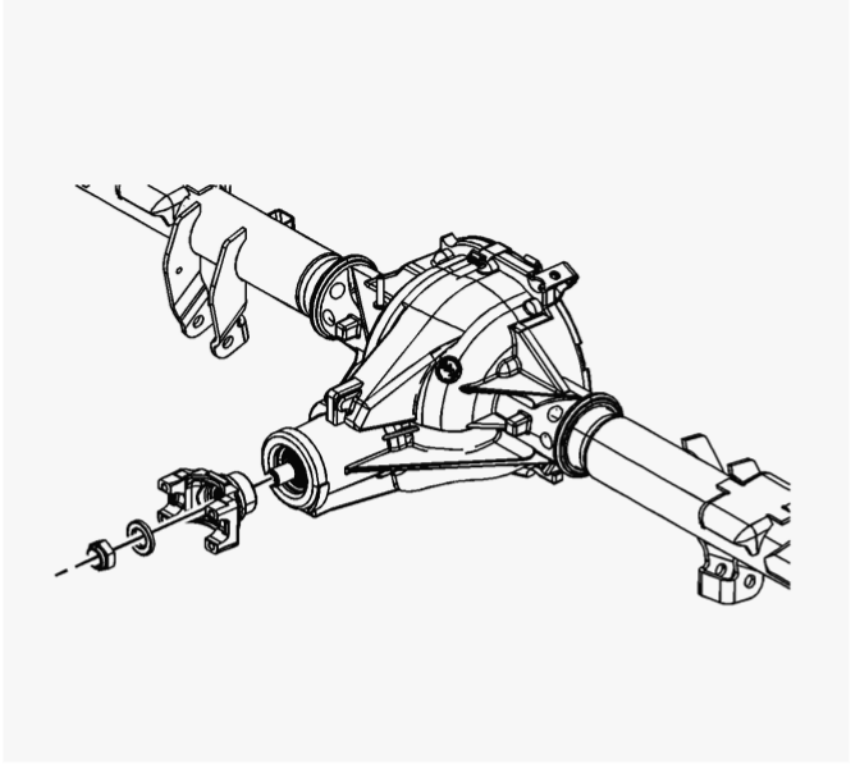


Fig. 213: Installing Pinion Yoke, Nut And Washer
Courtesy of GENERAL MOTORS COMPANY

2. Apply the proper sealant to the splines of the pinion yoke. Refer to Adhesives, Fluids, Lubricants, and Sealers
3. Align the reference marks and install the pinion yoke.

CAUTION: Refer to Pinion Flange/Yoke Installation Caution .

NOTE: Tap the pinion yoke until a few threads show through the pinion yoke.

4. Using a soft faced hammer, seat the pinion yoke onto the pinion shaft.
5. Install the washer and a NEW pinion nut.

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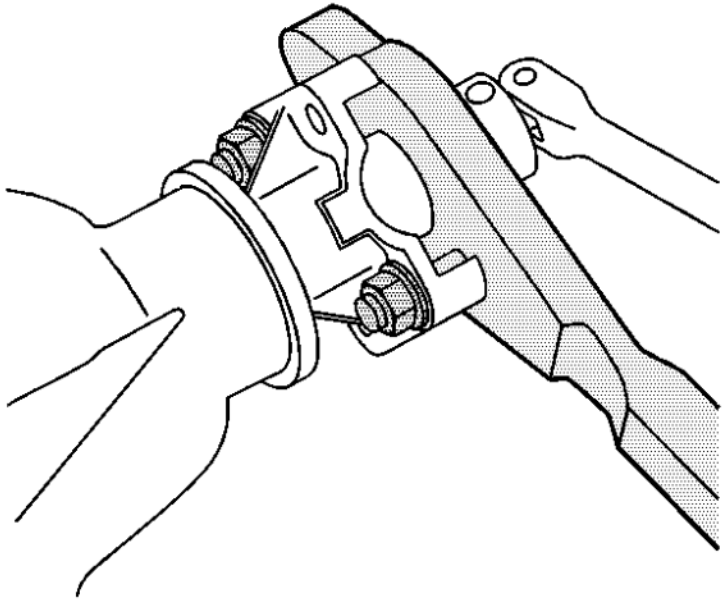


Fig. 214: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.**
- **For the 11.5 inch axle, use J-34826 socket.**

6. Holding the **J 8614-01** holder or the **J-34826** socket, tighten the pinion nut until the pinion end play is just taken up.
7. Rotate the pinion while tightening the nut to seat the bearings.

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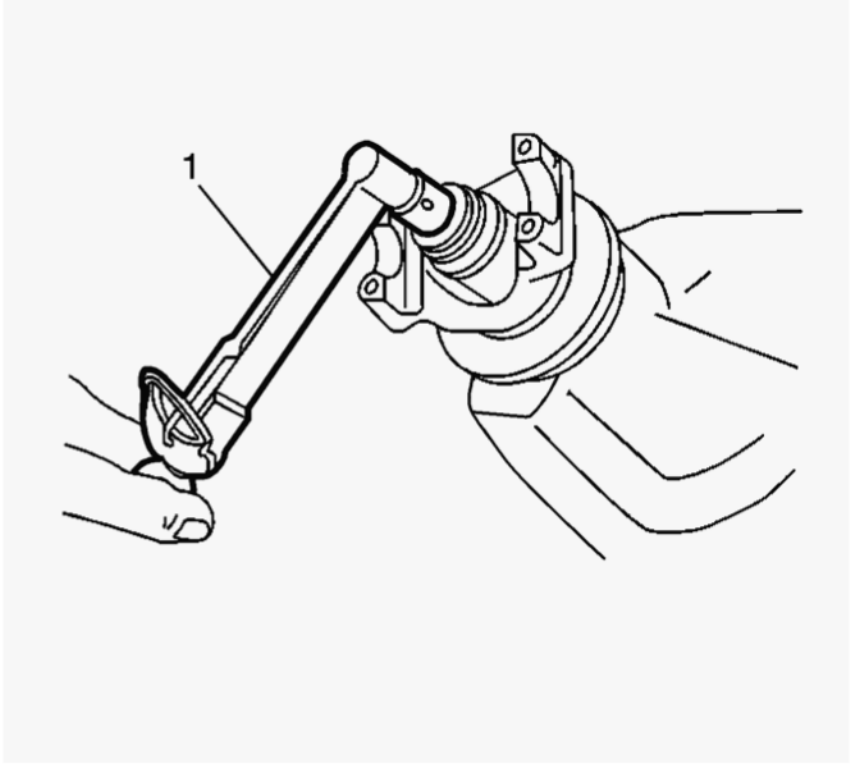


Fig. 215: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

CAUTION: **Refer to Fastener Caution .**

NOTE: **Compare this measurement with the rotating torque recorded during removal.**

8. Using an inch pound torque wrench and tightening in small increments, measure the rotating torque of the pinion until the reading is greater than 0.40-0.57 N.m (3-5 lb in), the rotational torque noted at removal.

NOTE: **Recheck the rotating torque and adjust if necessary.**

9. Once the specified torque is obtained, rotate the pinion several times to seat the bearings.

NOTE: **Reference mark the rear propeller shaft to the rear axle pinion yoke.**

10. Install the propeller shaft. Refer to Rear Propeller Shaft Replacement (Heavy Duty) Rear Propeller Shaft Replacement (M5U, 2WD)
11. Install the rear axle shafts. Refer to Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)
12. Install the rear disc brake rotor, if equipped. Refer to Rear Brake Rotor Replacement (JD9) Rear Brake Rotor Replacement (J95)
13. Install the rear tire and wheel assembly. Refer to Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel)
14. Inspect and add axle lubricant to the axle housing, if necessary. Refer to Rear Axle Lubricant Level Inspection (10.5 Inch Axle)
15. Remove the support and lower the vehicle.

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DIFFERENTIAL DRIVE PINION GEAR YOKE REPLACEMENT (8.6/9.5/9.76 INCH AXLES)

Special Tools

J-8614-01 Flange Holder and Remover

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

Removal Procedure

NOTE: **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 and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)** .
3. Remove the rear disc brake rotor, if equipped. Refer to **Rear Brake Rotor Replacement (JD9)** **Rear Brake Rotor Replacement (J95)** .

NOTE: **Reference mark the rear propeller shaft to the rear axle pinion yoke.**

4. Remove the propeller shaft. Refer to: **Rear Propeller Shaft Replacement (1500)** **Rear Propeller Shaft Replacement (Heavy Duty)** **Rear Propeller Shaft Replacement (M5U, 2WD)** .

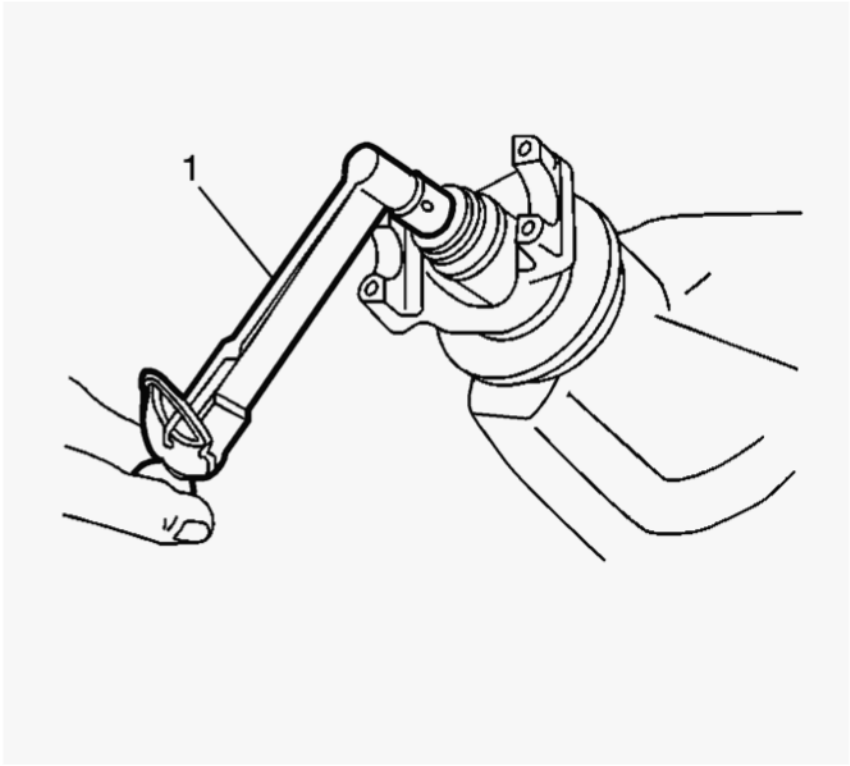


Fig. 216: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

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NOTE: **Record this measurement for reassembly.**

5. Using an inch-pound torque wrench, measure the rotational torque of the differential ring and pinion gear and related components.

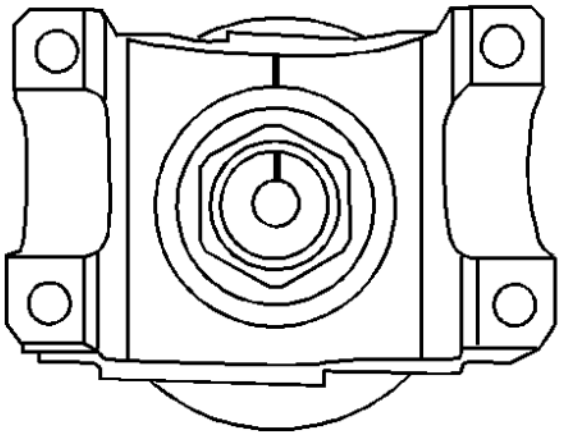


Fig. 217: Pinion Shaft And Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS COMPANY

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

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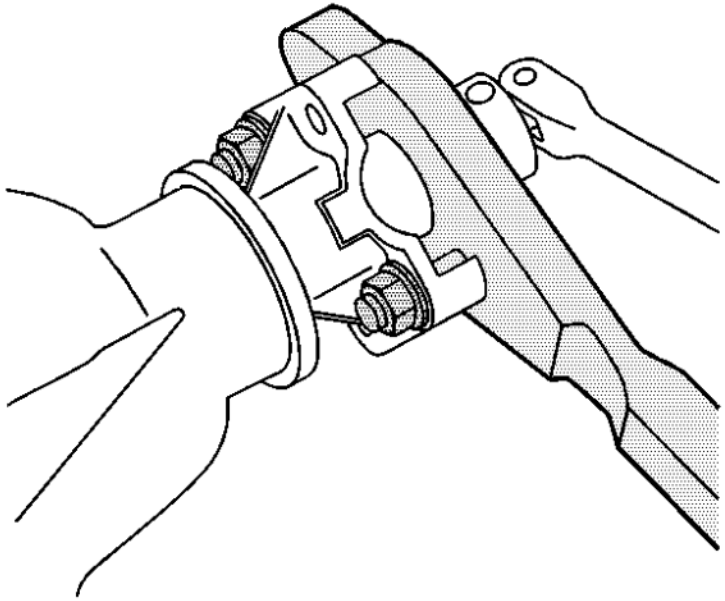


Fig. 218: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **DO NOT reuse the pinion nut, replace with NEW.**
- **9.5/9.76 axle pinion nut may require increased effort to break the nut staking loose before nut can be easily removed.**

7. Using the **J-8614-01** holder and remover or the J-34826 socket, remove and discard the pinion nut.

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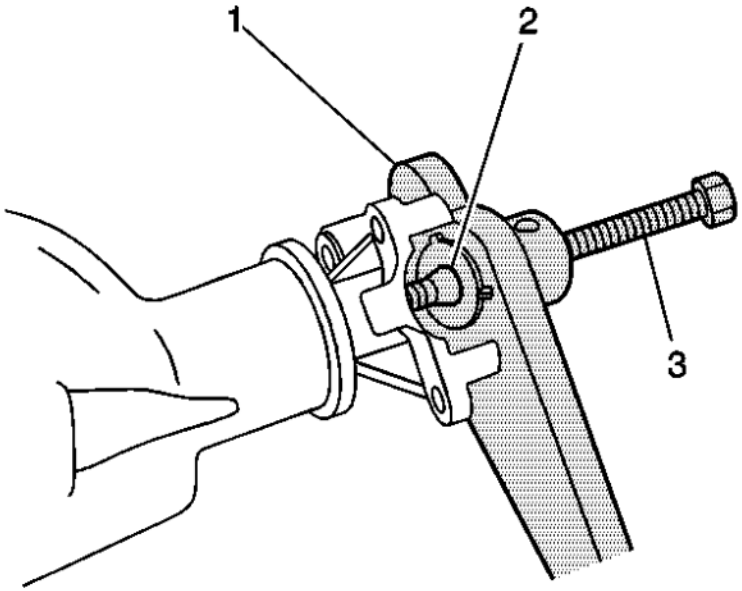


Fig. 219: Removing Pinion Yoke Using Special Tools
Courtesy of GENERAL MOTORS COMPANY

8. Using the J-8614-2 (2), J-8614-3 (3) and the **J-8614-01** remover (1), remove the pinion yoke. Remove the pinion yoke by turning the J-8614-3 (3) clockwise.

Installation Procedure

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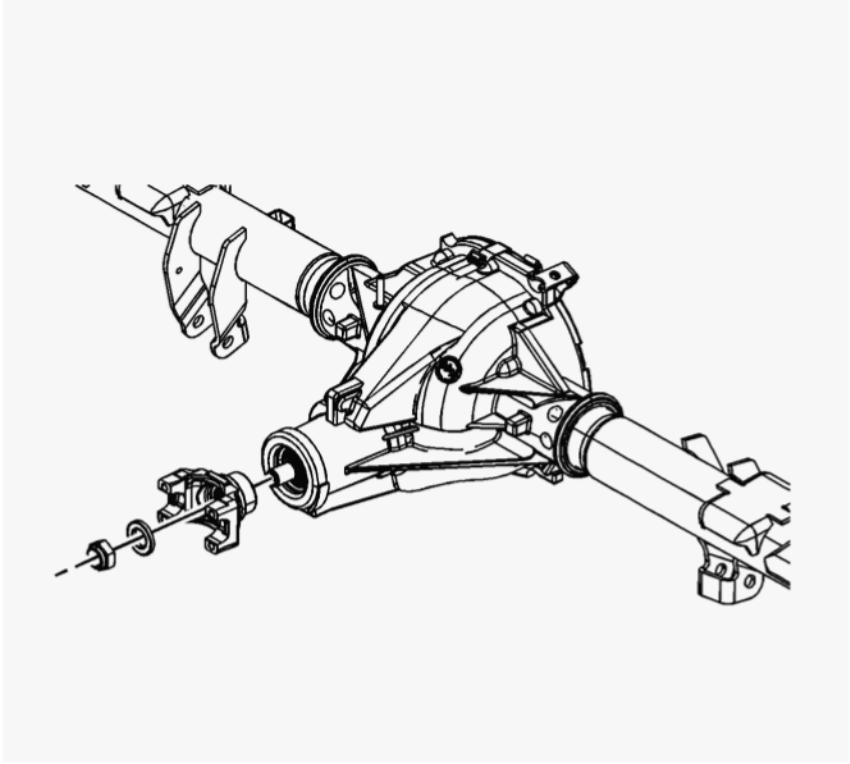


Fig. 220: Installing Pinion Yoke, Nut And Washer
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Do not apply excessive amounts of sealant to pinion yoke.**

1. Apply the proper sealant to the splines of the pinion yoke. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
2. Align the reference marks and install the pinion yoke.

CAUTION: **Refer to Pinion Flange/Yoke Installation Caution .**

3. Using a soft faced hammer, seat the pinion yoke onto the pinion shaft until a few threads are visible.
4. Install the washer (if applicable) and a NEW pinion nut.

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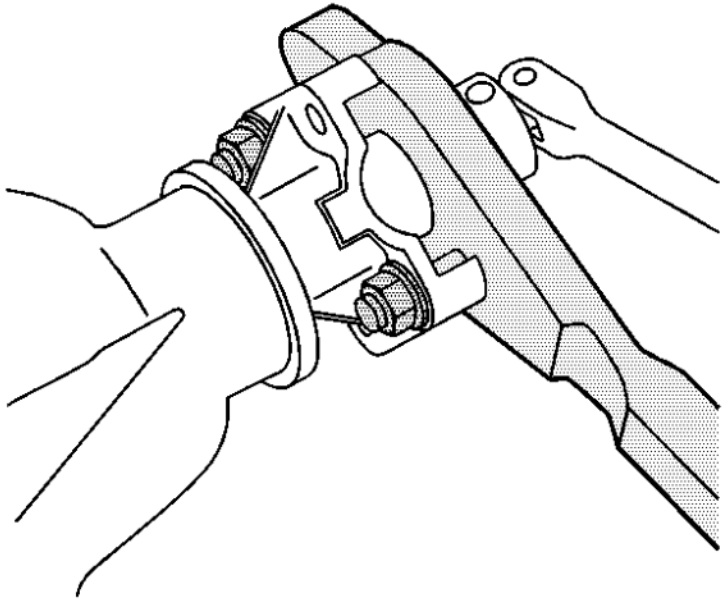


Fig. 221: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If the target rotating torque is exceeded during reassembly, the pinion flange assembly will have to be removed and a new collapsible spacer installed.**

5. Holding the **J-8614-01** holder, tighten the pinion nut until the pinion end play is just taken up.
6. Frequently rotate the pinion while tightening the nut to seat the bearings.

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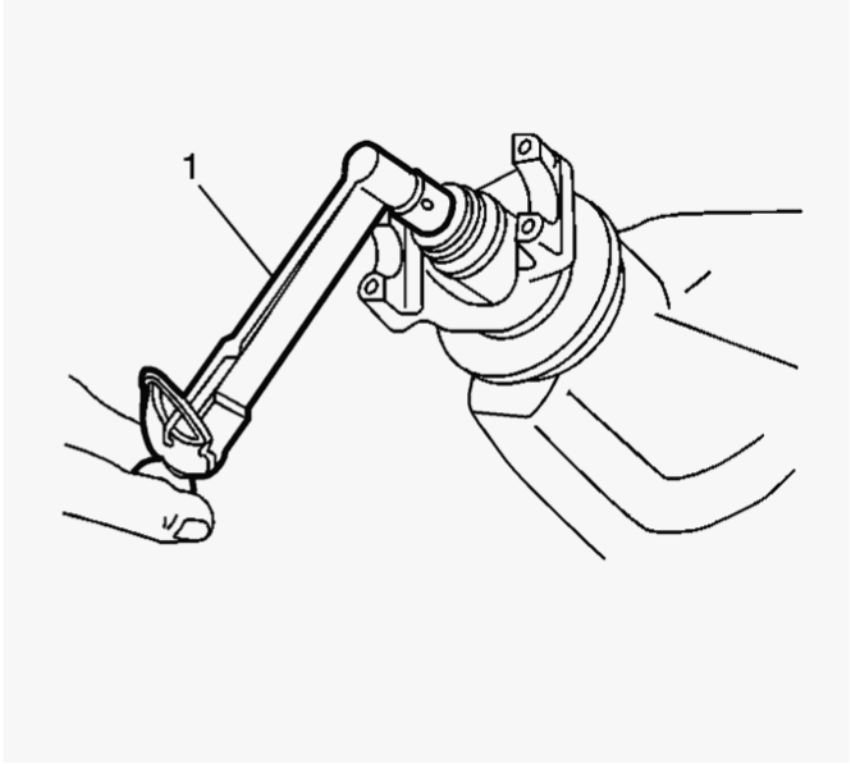


Fig. 222: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

NOTE: Compare this measurement with the rotating torque recorded during removal.

7. Using an inch pound torque wrench and tightening in small increments, measure the rotating torque of the pinion until the reading 0.40-0.57 N.m (3-5 lb in) greater than the rotational torque noted at removal.

NOTE:
- Recheck the rotating torque and adjust if necessary.
- 9.5 and 9.76 Axle - Use a hammer and punch to stake two sides of the drive pinion nut lip to the corresponding grooves in the drive pinion gear.
- Take care to not split the nut lip which could affect nut torque retention. If nut lip is split, use new nut.

8. Once the specified torque is obtained, rotate the pinion several times to seat the bearings.

NOTE: Realign the reference marks on the rear propeller shaft and the rear axle pinion yoke.

9. Install the propeller shaft. Refer to: Rear Propeller Shaft Replacement (1500) Rear Propeller Shaft Replacement (Heavy Duty) Rear Propeller Shaft Replacement (M5U, 2WD) .
10. Install the rear disc brake rotor, if equipped. Refer to Rear Brake Rotor Replacement (JD9) Rear Brake Rotor Replacement (J95) .
11. Install the rear tire and wheel assembly. Refer to Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel) .

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12. Inspect and add axle lubricant to the axle housing, if necessary. Refer to **Rear Axle Lubricant Level Inspection (8.6, 9.5/9.76 Inch Axle)**.
13. Remove the support and lower the vehicle.

DIFFERENTIAL DRIVE PINION GEAR YOKE REPLACEMENT (10.5 INCH AXLE)

Special Tools

- **J-8614-01** Flange Holder and Remover
- **J-22388** Pinion Oil Seal Installer
- **J-34826** Hub Nut Socket - 36 mm

Equivalent regional tools: **Special Tools**

Removal Procedure

NOTE: **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 and support the vehicle. Refer to **Lifting and Jacking the Vehicle**
2. Remove the rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation (6-Lug Wheel)** **Tire and Wheel Removal and Installation (8-Lug Wheel)**
3. Remove the rear disc brake rotor, if equipped. Refer to **Rear Brake Rotor Replacement (JD9)** **Rear Brake Rotor Replacement (J95)**
4. Remove the rear axle shafts. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**

NOTE: **Reference mark the rear propeller shaft to the rear axle pinion yoke.**

5. Remove the propeller shaft. Refer to **Rear Propeller Shaft Replacement (Heavy Duty)** **Rear Propeller Shaft Replacement (M5U, 2WD)**

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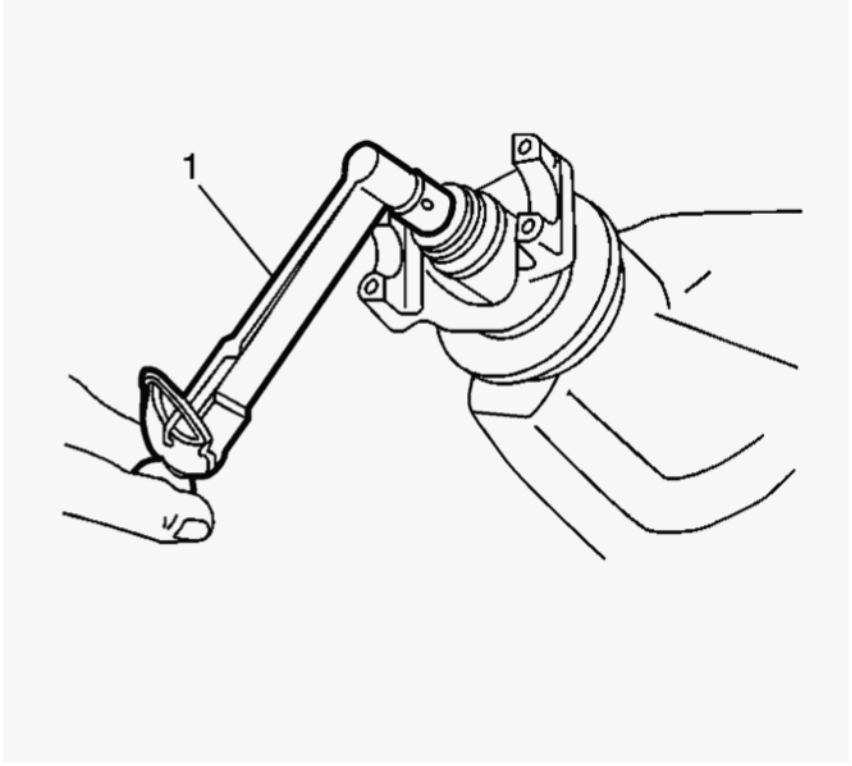


Fig. 223: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Record this measurement for reassembly.**

6. Using an inch-pound torque wrench, measure the rotational torque of the differential ring and pinion gear and related components.

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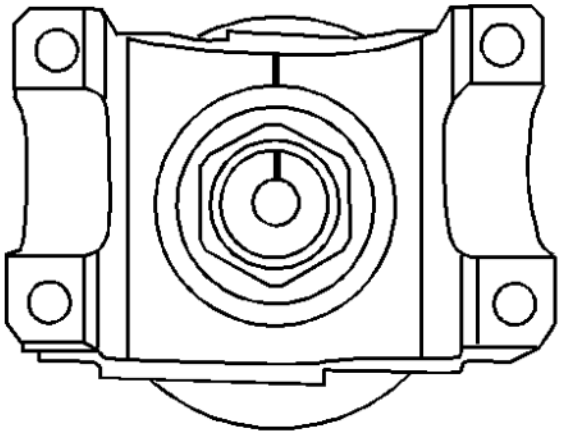


Fig. 224: Pinion Shaft And Pinion Yoke Alignment Marks
Courtesy of GENERAL MOTORS COMPANY

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

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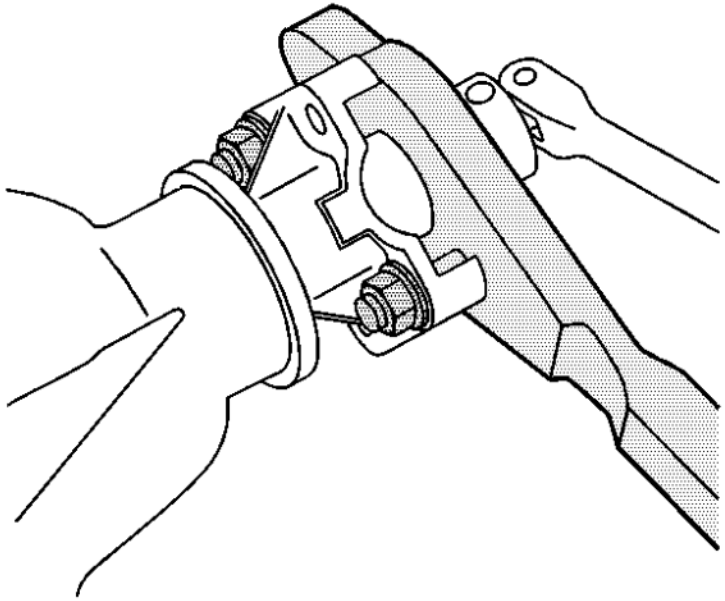


Fig. 225: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **DO NOT reuse the pinion nut, replace with NEW.**
- **For the 11.5 inch axle, use J-34826 socket.**

8. Using the **J-8614-01** holder and remover or the **J-34826** socket, remove and discard the pinion the pinion nut.

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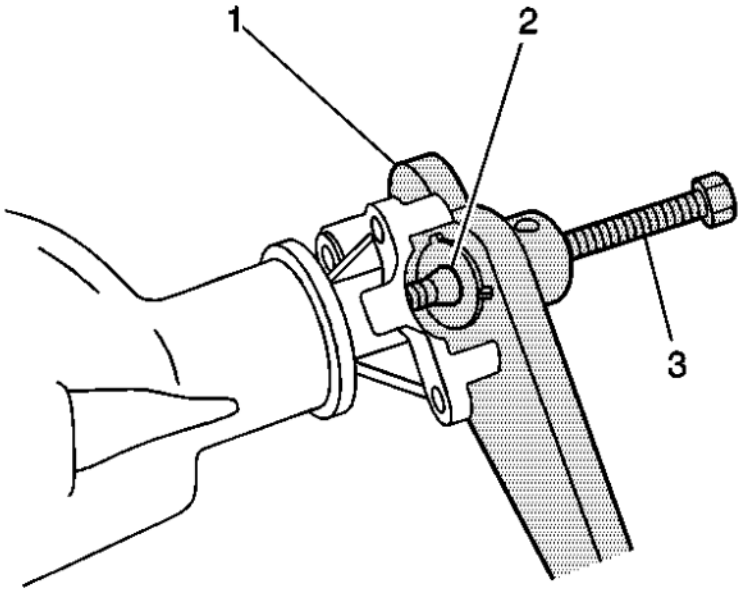


Fig. 226: Removing Pinion Yoke Using Special Tools
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Remove the pinion yoke by turning the J-8614-3 (3) clockwise.**

9. Using the **J-8614-2** (2), **J-8614-3** (3) and the **J-8614-01** remover (1), remove the pinion yoke.

Installation Procedure

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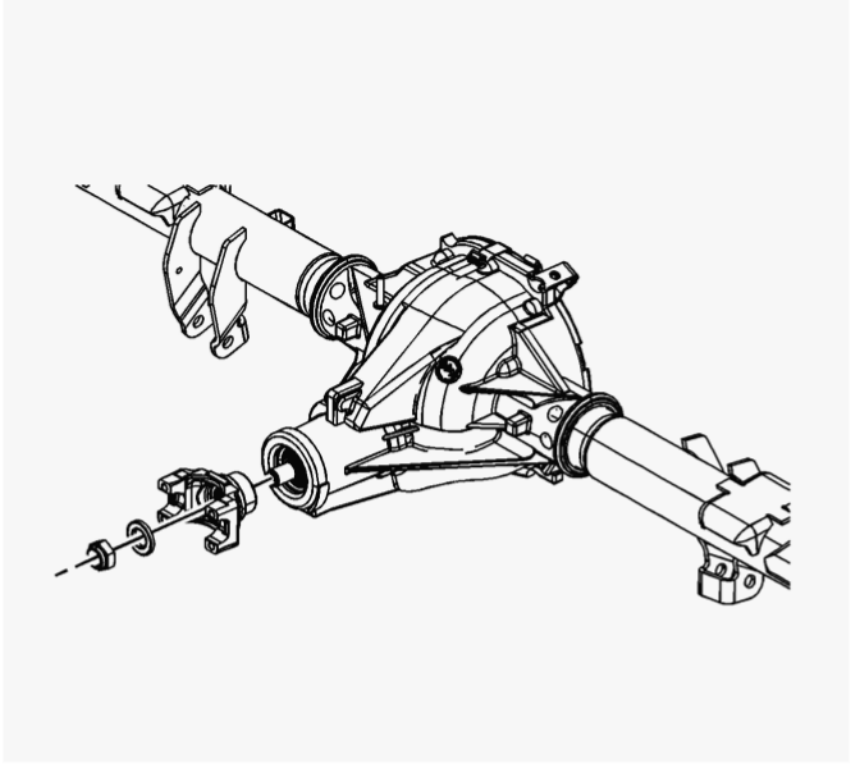


Fig. 227: Installing Pinion Yoke, Nut And Washer
Courtesy of GENERAL MOTORS COMPANY

1. Apply the proper sealant to the splines of the pinion yoke. **Adhesives, Fluids, Lubricants, and Sealers**
2. Align the reference marks and install the pinion yoke.

CAUTION: **Refer to Pinion Flange/Yoke Installation Caution .**

NOTE: **Tap the pinion yoke until a few threads show through the pinion yoke.**

3. Using a soft faced hammer, seat the pinion yoke onto the pinion shaft.
4. Install the washer and a NEW pinion nut.

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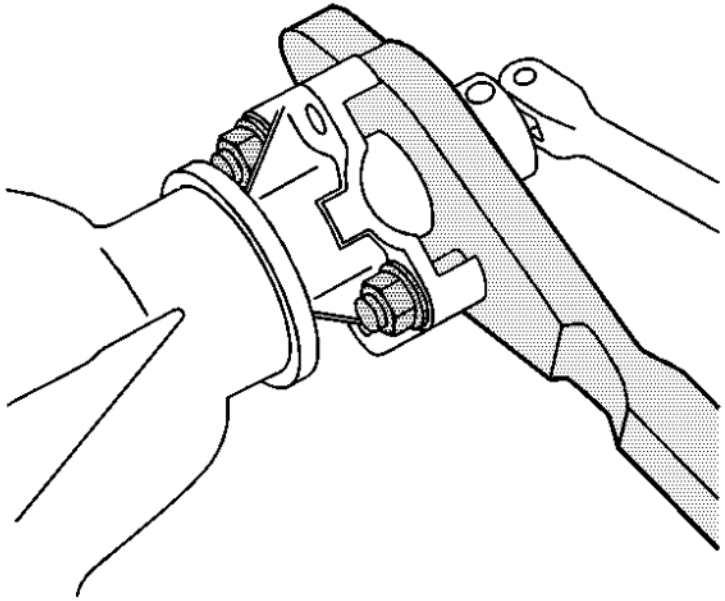


Fig. 228: Holding Pinion Yoke With Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **If the rotating torque is exceeded, the pinion will have to be removed and a new collapsible spacer installed.**
- **For the 11.5 inch axle, use J-34826 socket.**

5. Holding the **J 8614-01** holder or the **J-34826** socket, tighten the pinion nut until the pinion end play is just taken up.
6. Rotate the pinion while tightening the nut to seat the bearings.

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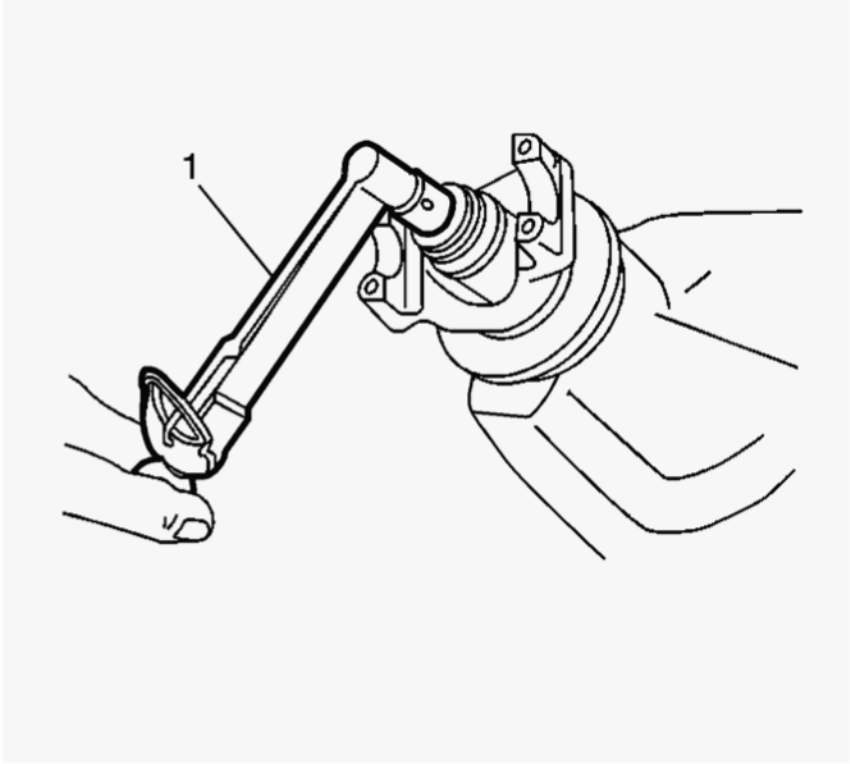


Fig. 229: Measuring Pinion Rotating Torque
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

NOTE: Compare this measurement with the rotating torque recorded during removal.

7. Using an inch pound torque wrench and tightening in small increments, measure the rotating torque of the pinion until the reading is greater than 0.40-0.57 N.m (3-5 lb in), the rotational torque noted at removal.

NOTE: Recheck the rotating torque and adjust if necessary.

8. Once the specified torque is obtained, rotate the pinion several times to seat the bearings.

NOTE: Reference mark the rear propeller shaft to the rear axle pinion yoke.

9. Install the propeller shaft. Refer to Rear Propeller Shaft Replacement (Heavy Duty) Rear Propeller Shaft Replacement (M5U, 2WD)
10. Install the rear axle shafts. Refer to Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle).
11. Install the rear disc brake rotor, if equipped. Refer to Rear Brake Rotor Replacement (JD9) Rear Brake Rotor Replacement (J95)
12. Install the rear tire and wheel assembly. Refer to Tire and Wheel Removal and Installation (6-Lug Wheel) Tire and Wheel Removal and Installation (8-Lug Wheel)
13. Inspect and add axle lubricant to the axle housing, if necessary. Refer to Rear Axle Lubricant Level Inspection (10.5 Inch Axle)
14. Remove the support and lower the vehicle.

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DIFFERENTIAL OVERHAUL (8.6/9.5/9.76 INCH AXLES)

Disassembly Procedure

1. Remove the differential ring gear. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**
2. Remove the differential side bearings. Refer to **Differential Bearing Replacement**.

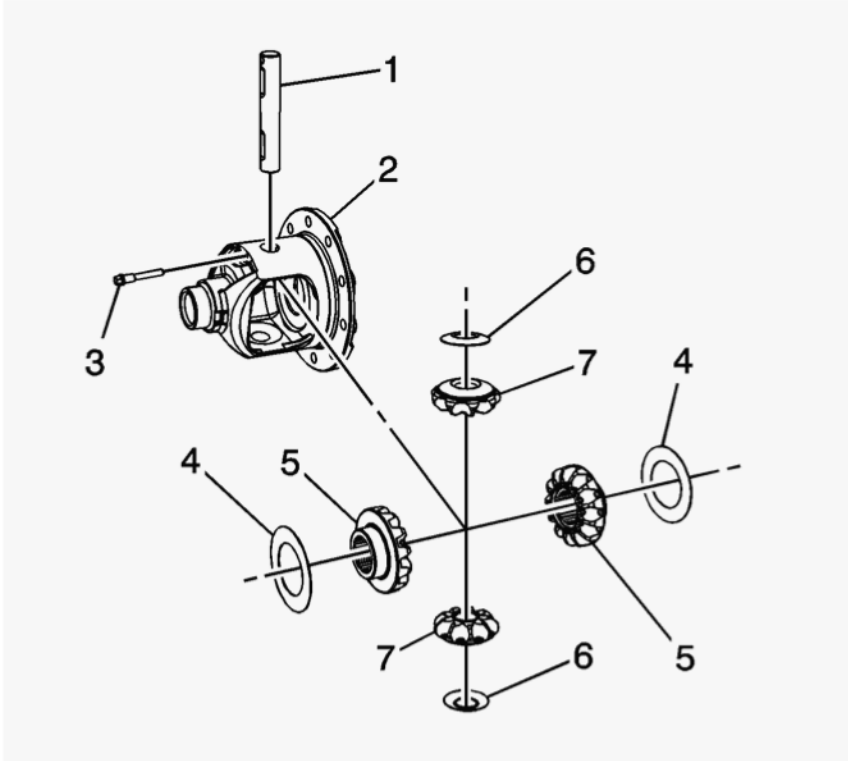


Fig. 230: Side Gears, Pinion Gears And Attached Components
Courtesy of GENERAL MOTORS COMPANY

3. Remove and discard the differential pinion gear shaft lock bolt (3). Replace with NEW only.
4. Remove the differential pinion gear shaft (1).

NOTE: **Mark the top and bottom differential pinion gears and thrust washers, if reusing.**

5. Roll the differential pinion gears (7) and the thrust washers (6) out of the differential case (2).

NOTE: **Mark the left and right side differential side gears and the thrust washers, if reusing.**

6. Remove the differential side gears (5) and the thrust washers (4).

Assembly Procedure

1. Lubricate the pinion and side gears and washers using the proper axle lubricant. Refer to **Fluid and Lubricant Recommendations** .

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2. Install the differential side gear thrust washers (4) to the differential side gears (5).

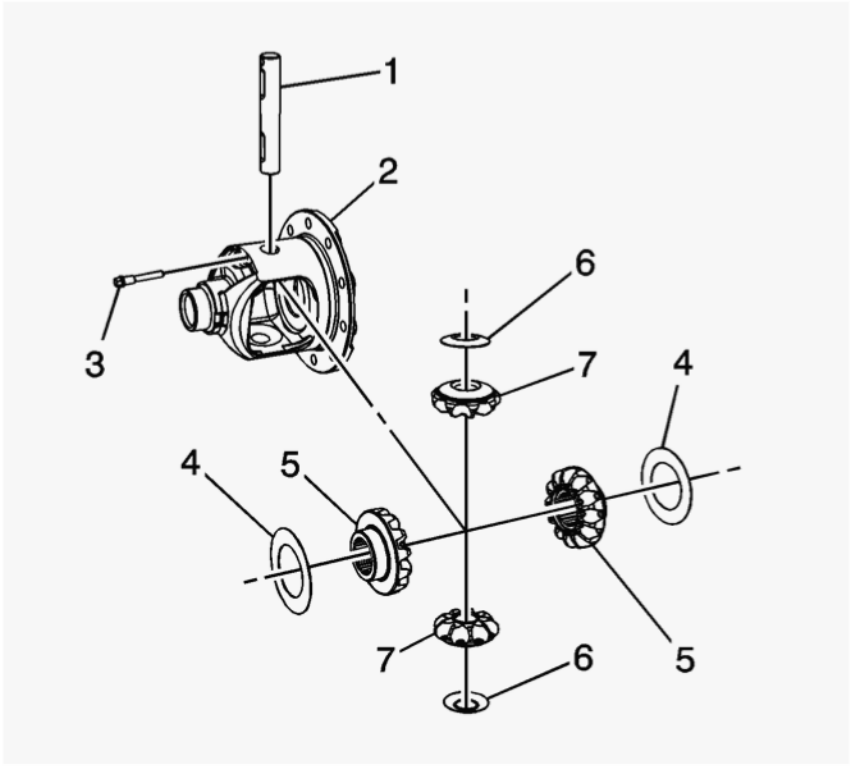


Fig. 231: Side Gears, Pinion Gears And Attached Components
Courtesy of GENERAL MOTORS COMPANY

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

3. Install the differential side gears (5) and thrust washers (4) into the differential case (2).
4. Position one pinion gear (7) between the differential side gears (5).
5. Position the second pinion gear (7) between the differential side gears (5).
6. Rotate the differential side gears (5) until the pinion gears (7) are directly opposite the opening in the differential case (2).
7. Rotate the pinion gears (7) toward the differential opening.
8. Install the thrust washers (6) on the pinion gears (5).
9. Rotate the pinion gears until they are aligned with the holes in the differential case (2) for the pinion shaft (1).
10. Install the pinion shaft (1).

CAUTION: **Refer to Fastener Caution .**

11. Install the NEW differential pinion gear shaft locking bolt and tighten to:
    - For the 8.6 inch axle, tighten the pinion shaft bolt (3) to 36 N.m (27 lb ft).
    - For the 9.5/9.76 inch axle, tighten the pinion shaft bolt (3) to 50 N.m (37 lb ft).

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12. Install the differential ring gear to the differential case. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.
13. Install the differential side bearings. Refer to **Differential Bearing Replacement**.

DIFFERENTIAL OVERHAUL (10.5 INCH AXLE)

Disassemble Procedure

1. Remove the differential side bearings. Refer to **Differential Bearing Replacement**.
2. Remove the differential ring gear. Refer to **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.

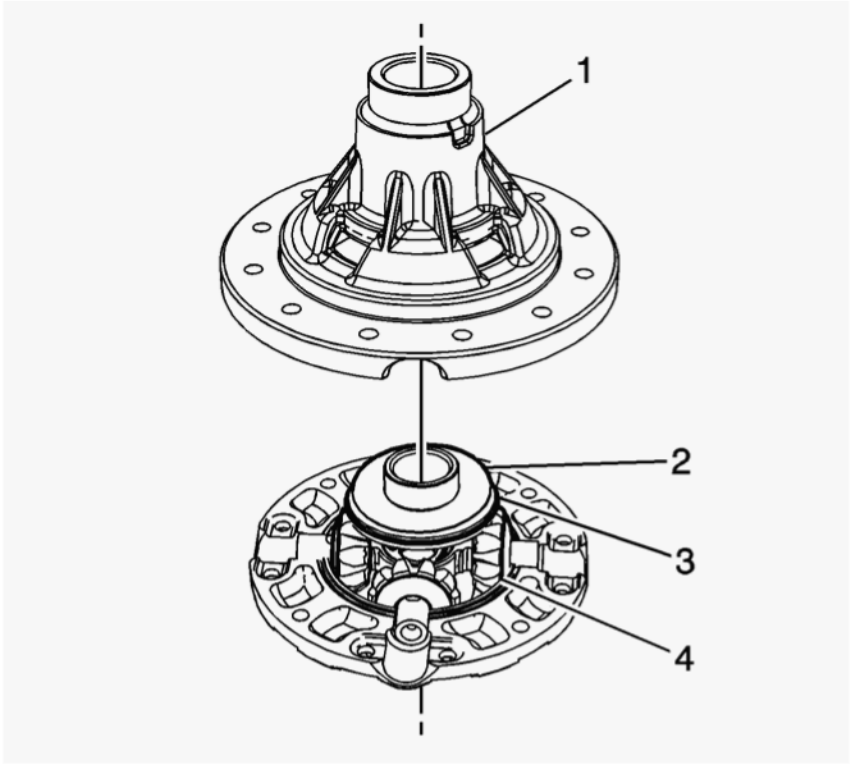


Fig. 232: Differential Side Gear, Thrust Washer And Differential Pinion Gears
Courtesy of GENERAL MOTORS COMPANY

3. Separate the differential case (1).

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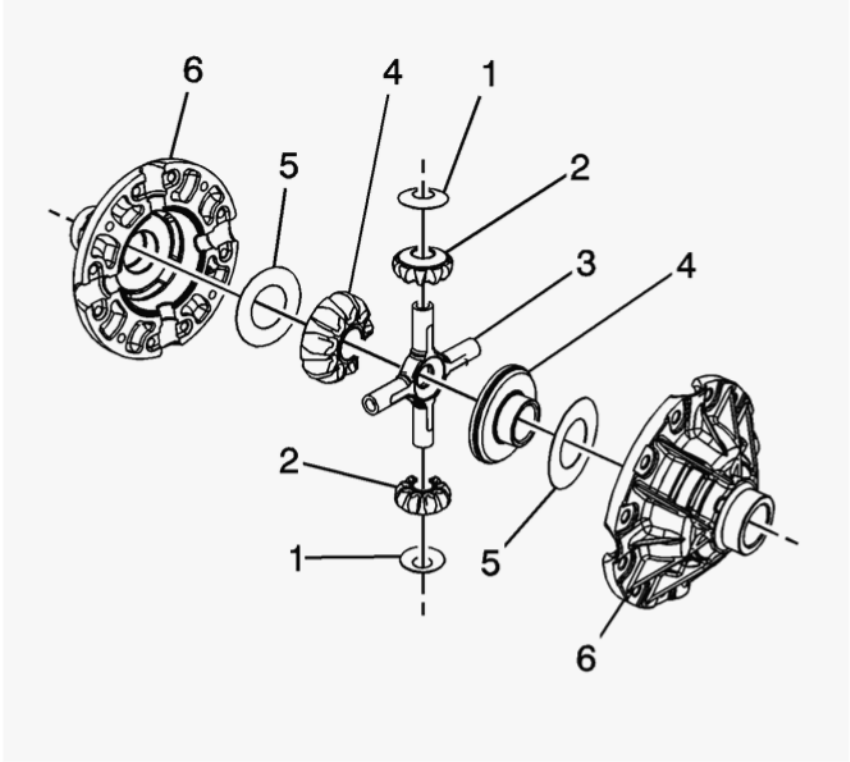


Fig. 233: Exploded View Of Differential Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If the differential pinion gears, the differential side and the thrust washers are going to be reused, mark the components so they can be re-installed in their original location in the differential case.**

4. Remove the pinion gears (2), thrust washers (1) and the differential spider (3) from the differential case (6).
5. Remove the differential side gears (4) and the thrust washers (5) from the differential case (5).

Assemble Procedure

1. Apply a small amount of the proper gear lubricant to the differential side gears and the differential pinion gears. Refer to **Fluid and Lubricant Recommendations** .

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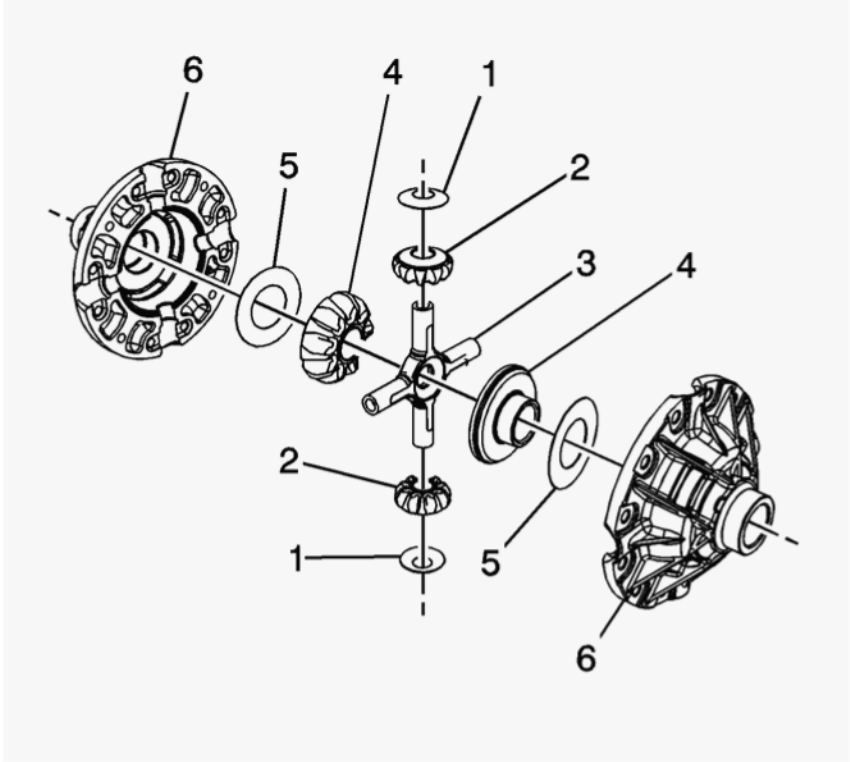


Fig. 234: Exploded View Of Differential Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If reusing the differential side and pinion gears, install them in the original position.**

2. Install the thrust washers (5) differential side gears (4) into the differential case (6).
3. Install the differential pinion gears (2), thrust washer (1) on the differential spider (3).
4. Position the differential thrust washers (1), pinion gears (2) and the spider (3) in the differential case (5).

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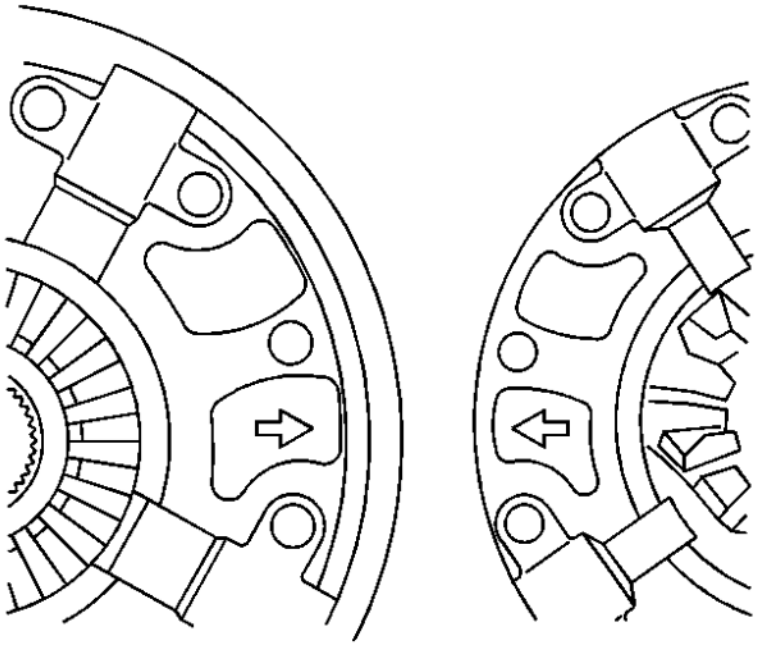


Fig. 235: Aligning Differential Case Arrows
Courtesy of GENERAL MOTORS COMPANY

5. Align the arrows on the differential case halves.

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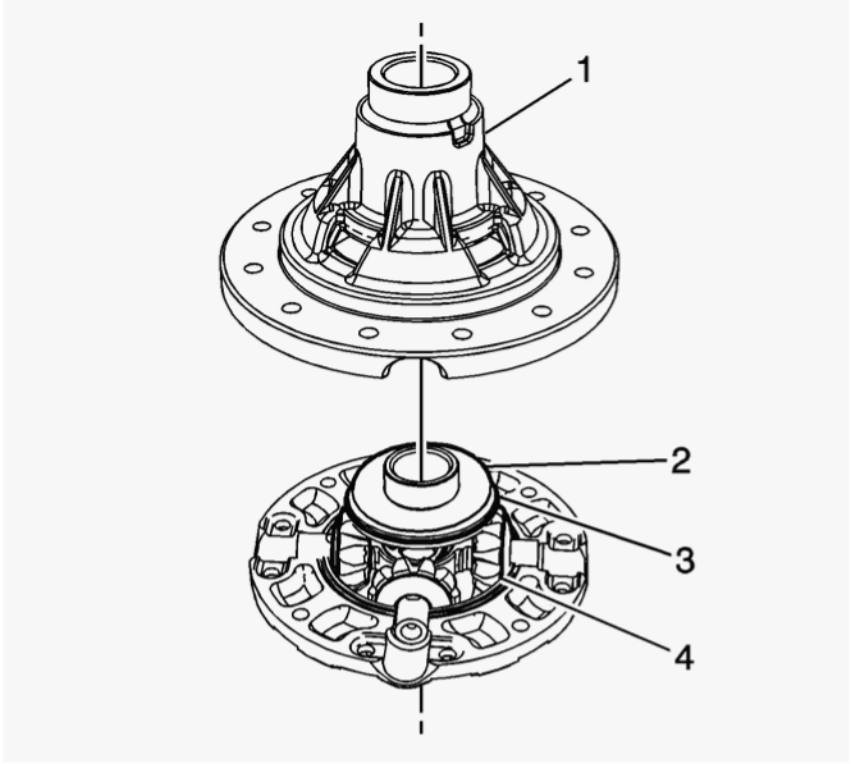


Fig. 236: Differential Side Gear, Thrust Washer And Differential Pinion Gears
Courtesy of GENERAL MOTORS COMPANY

6. Position the differential side gear (3) and the thrust washer (3) on the differential pinion gears (4).
7. Install the differential case half (1).
8. Install the differential ring gear. Refer to **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
9. Install the differential side bearings. Refer to **Differential Bearing Replacement**.

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.

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- Check the pinion and the side gear teeth for wear, cracks, scoring and spalling.
- Check the thrust washers for wear.
- Check the fit of the side gears in the differential case and on the axle shafts.
- Check the differential case for cracks and scoring and replace all of the worn parts as necessary.

PINION AND RING GEAR INSPECTION

Ring and pinion gears are matched sets. When replacement of one or the other is necessary, both the ring and pinion gear must be replaced.

- Check the pinion and ring gear teeth for cracking, chipping, scoring, or excessive wear.
- Check the pinion gear splines for wear.
- Check the pinion flange/yoke splines for wear.
- Check the fit of the pinion gear splines on the pinion flange/yoke.
- Check the sealing surface of the pinion flange/yoke for nicks, burrs or rough tool marks that could damage the seal and cause an oil leak.
- Check for worn or broken parts and replace as necessary.

REAR AXLE HOUSING INSPECTION

Carefully and thoroughly inspect all drive unit parts before assembly. Thorough inspection of the drive parts for wear or stress with subsequent replacement of worn parts eliminates costly drive component repair after assembly.

- Inspect for nicks or burrs that could prevent the outer diameter of the pinion seal from sealing. Remove any burrs.
- Inspect the bearing cup bores for nicks or burrs. Remove any burrs that are found.
- Inspect the housing for cracks. Replace the housing if any cracks are found.
- Inspect the housing for foreign material such as metal chips, dirt, or rust.

SHIMS INSPECTION

NOTE:

- **8.6 Rear Axle: The original cast iron production shims cannot be re-used and must be replaced with steel service shims if the differential or any production shim(s) is/are removed.**
- **9.5/10.5/11.5 Rear Axle: The original cast iron production shims can be carefully removed and re-used. If the cast iron shims show any signs of excessive wear or damage, they must be replaced with service shims and spacers.**
- **If service shims were previously installed, the shims can be reused.**

NOTE: **Carefully inspect the shims for cracks, chips or other damage. Replace any damaged shims with NEW steel service shims only.**

PINION DEPTH ADJUSTMENT (8.6 INCH AXLE)

Special Tools

- **GE-8001** Dial Indicator Set
- **J-21777** Side Bearing Disc Set
- **J-34925** Pinion Setting Gauge Set

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

NOTE: **Make sure all of the tools, the differential side bearing bores, and the pinion bearing cups are clean before proceeding.**

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1. Using the proper axle lubricant, lubricant the differential pinion bearings. Refer to **Fluid and Lubricant Recommendations** .
2. Install the differential pinion bearings into the axle housing.

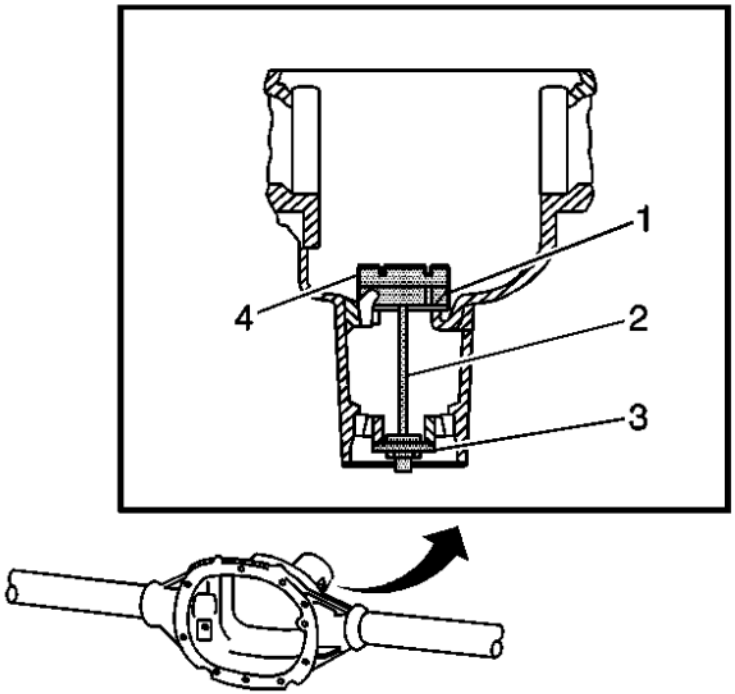


Fig. 237: Assembling Special Tools In Axle Housing
Courtesy of GENERAL MOTORS COMPANY

3. Install the **J-21777-35** (1), **J-21777-43** (2), **J-21777-42** (3), and the **J-21777-29** into the axle housing.

   Hold the **J-21777-43** stationary while turning the torque wrench.

   Rotate the assembly several times in both directions in order to seat the pinion bearings.

4. Using an inch pound torque wrench and the **J-21777-43** , tighten the nut until a rotating torque of 1.7 N.m (15 lb in) is obtained.
5. If the torque is less than 1.7 N.m (15 lb in), tighten the nut until a rotating torque of 1.7-2.3 N.m (15-20 lb in) is obtained.

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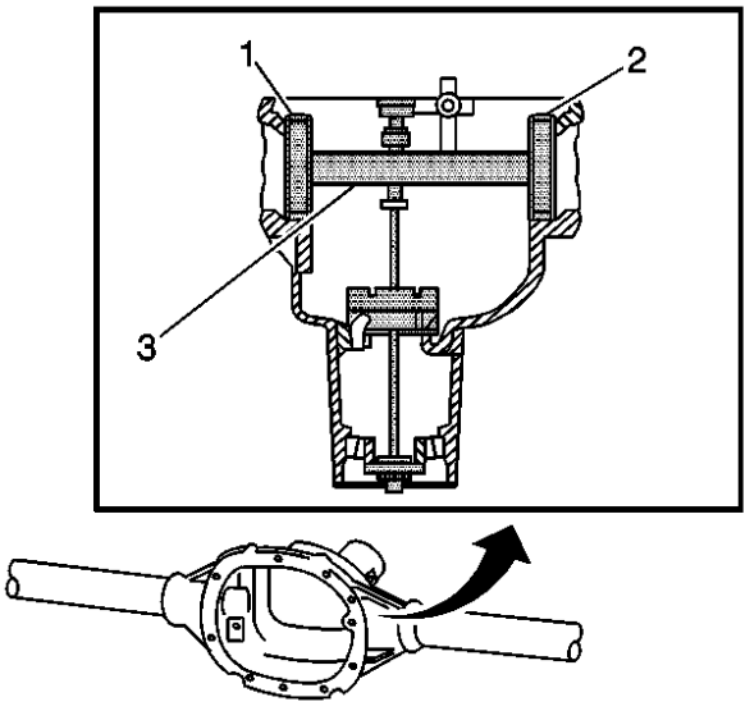


Fig. 238: Assembling Special Tools In Differential Carrier Bore
Courtesy of GENERAL MOTORS COMPANY

6. Install the **J-21777-45** (1 and 2) to the **J-21777-1** (3) into the differential carrier bores.
7. Install the bearing caps.

CAUTION: **Refer to Fastener Caution .**

8. Install the bearing cap bolts and tighten to 75 N.m (55 lb ft).
9. Rotate the **J-21777-1** within the **J-21777-45** .

The **J-21777-1** must rotate back and forth freely within the discs. If the **J-21777-1** does not rotate freely, disassemble the components, inspect for proper seating and/or mis-aligned components and re-assemble.

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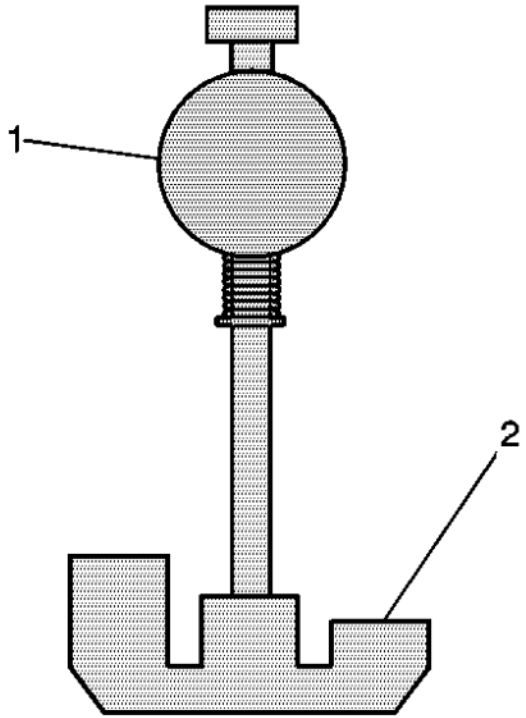


Fig. 239: Pinion Setting Gauge Set
Courtesy of GENERAL MOTORS COMPANY

10. Adjust the arbor of the **J-21777-1** (1) to the gauge block setting of the **J-21777-29**
11. Install the **GE-8001** indicator to the **J-21777-1** as follows:
    1. Loosely clamp the **GE-8001** indicator onto the stem on the **J-21777-1** .
    2. Place the contact pad of the **GE-8001** indicator onto the mounting post of the **J-21777-1** .
    3. With the contact pad of the **GE-8001** indicator touching the mounting post of the **J-21777-1** , loosen the lock nut on the **GE 8001** indicator and push down on the **J 8001** indicator until the needle the **GE-8001** indicator has turned 3/4 of a turn clockwise.
    4. Tighten the clamp on the **GE-8001** indicator finger tight.

NOTE: **The deflection is the point where the needle changes direction.**

12. Move the plunger of the **J-21777-1** back and forth until the needle of the **GE-8001** indicator indicates the greatest deflection.

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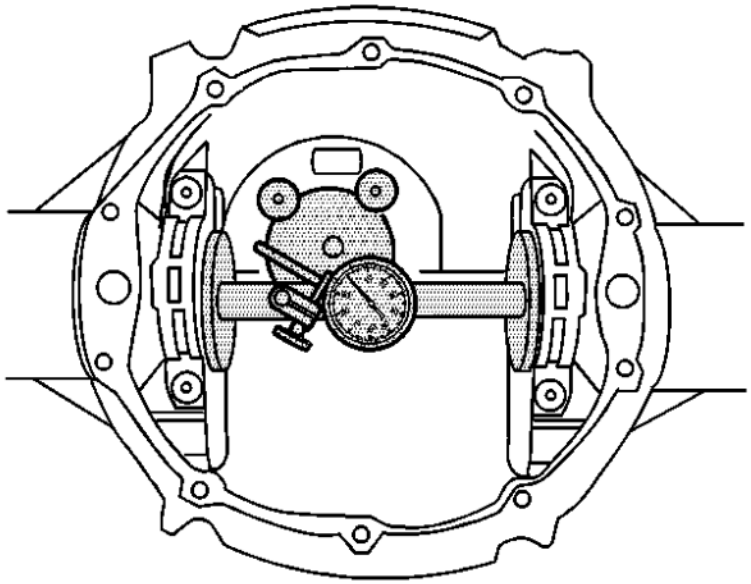


Fig. 240: Measuring Necessary Shim Thickness
Courtesy of GENERAL MOTORS COMPANY

13. At the greatest point of deflection, move the housing of the **GE-8001** indicator 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 **GE 8001** Dial Indicator Set as necessary to set the needle to zero.
15. Rotate the plunger of the **J-21777-1** away from the **J-21777-29** .
16. The value indicated on the **GE-8001** indicator is the thickness of the shim needed in order to set the depth of the pinion.
17. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
18. Remove the pinion depth setting tools.
19. Remove the pinion bearings.
20. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.

PINION DEPTH ADJUSTMENT (10.5 INCH AXLE)

1. Install the differential, if necessary. Refer to **Differential Replacement (10.5 Inch Axle)**.

NOTE: **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.

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

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3. Install the pinion gear bearing retainer.

CAUTION: **Refer to Fastener Caution .**

4. Install the pinion gear bearing retainer bolts and tighten to 88 N.m (65 lb ft).
5. Adjust the backlash. Refer to **Backlash Adjustment (10.5 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 and tighten to 88 N.m (65 lb ft).
    7. Inspect the gear tooth contact pattern of the pinion and the ring gear. Refer to **Gear Tooth Contact Pattern Inspection**.
    8. If the gear tooth pattern is still incorrect, adjust the shim thickness as necessary and recheck the gear tooth pattern of the pinion and the ring gear.
8. Inspect the backlash between the pinion and the ring gear and adjust, if necessary. Refer to **Backlash Adjustment (10.5 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)

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PINION DEPTH ADJUSTMENT (9.5 INCH AXLE)

Special Tools

- **GE-8001** Dial Indicator Set
- **J-34925** Pinion Setting Gauge Set
- **J-45108** Gauge Plate

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

NOTE: **Make sure all of the tools, the differential side bearing bores, and the pinion bearing cups are clean before proceeding.**

1. Using the proper axle lubricant, lubricant the differential pinion bearings. Refer to **Fluid and Lubricant Recommendations** .
2. Install the differential pinion bearings into the axle housing.

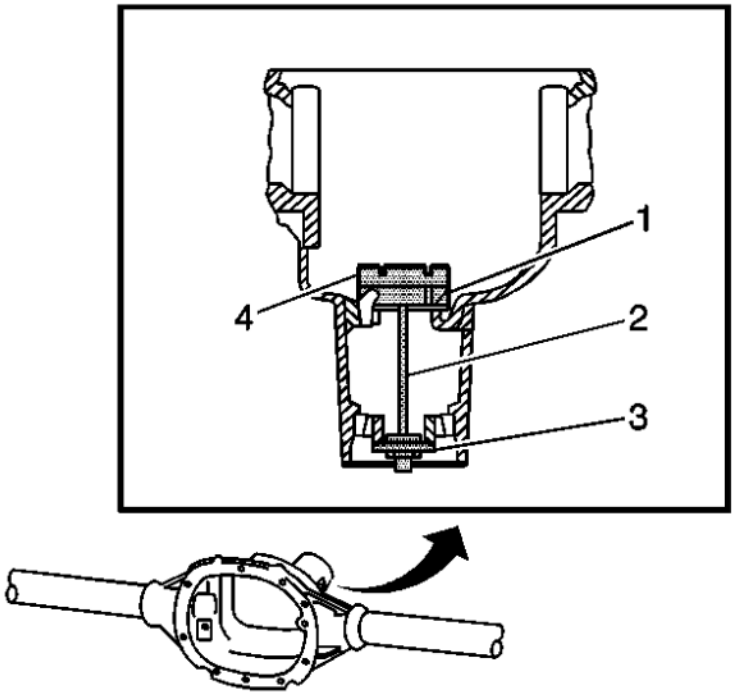


Fig. 241: Assembling Special Tools In Axle Housing
Courtesy of GENERAL MOTORS COMPANY

3. Install the **J-21777-8** (1), **J-21777-43** (2), **J-21777-42** (3), and the **J-45108** plate (4) into the axle housing.

   Hold the **J-21777-43** (2) stationary while turning the torque wrench.

   Rotate the assembly several times in both directions in order to seat the pinion bearings.

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4. Using an inch pound torque wrench and the **J-21777-43** (2), tighten the nut until a rotating torque of 1.7 N.m (15 lb in) is obtained.
5. If the torque is less than 1.7 N.m (15 lb in), tighten the nut until a rotating torque of 1.7-2.3 N.m (15-20 lb in) is obtained.

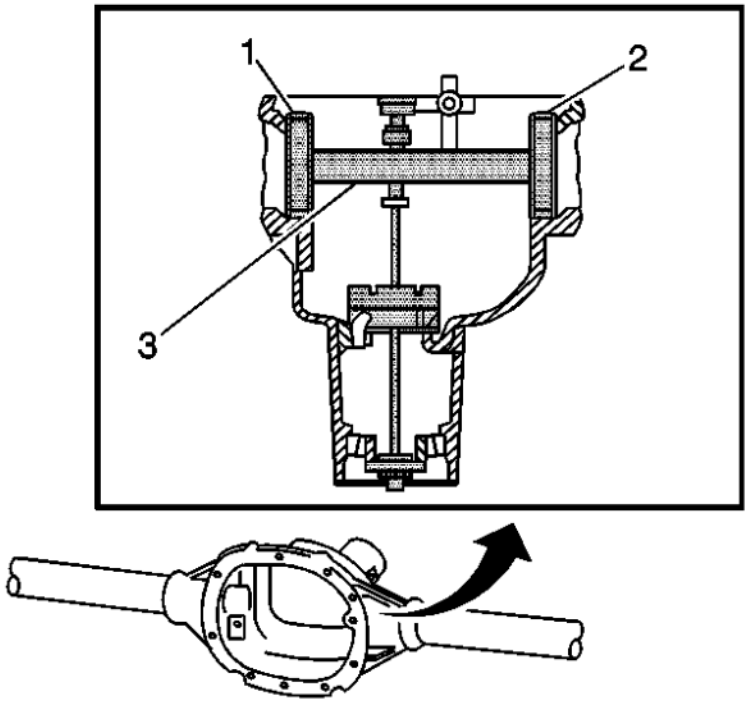


Fig. 242: Assembling Special Tools In Differential Carrier Bore
Courtesy of GENERAL MOTORS COMPANY

6. Install the **J-21777-86** (1 and 2) to the **J-21777-1** (3) in the differential carrier bores.
7. Install the bearing caps.

CAUTION: **Refer to Fastener Caution .**

8. Install the bearing cap bolts and tighten to 75 N.m (55 lb ft).
9. Rotate the **J-21777-1** within the **J-21777-86**

The **J-21777-1** must rotate back and forth freely within the discs. If the **J-21777-1** does not rotate freely, disassemble the components, inspect for proper seating and/or mis-aligned components and re-assemble.

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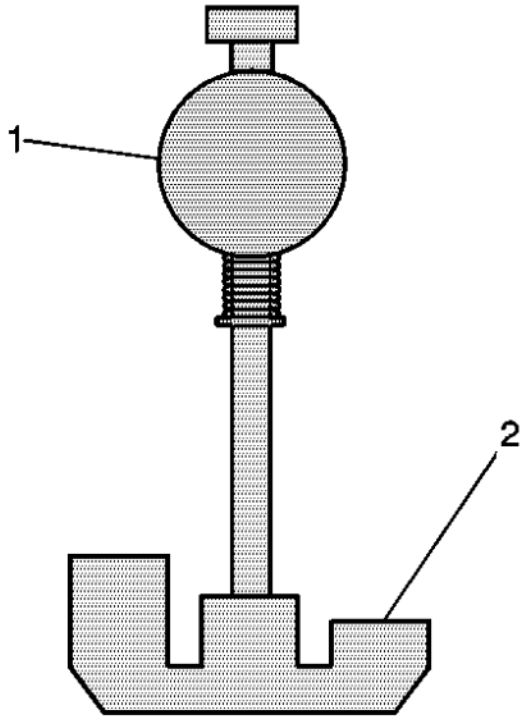


Fig. 243: Pinion Setting Gauge Set
Courtesy of GENERAL MOTORS COMPANY

10. Adjust the arbor of the **J-21777-1** (1) to the gauge block setting of the **J-45108** plate,
11. Install the **GE-8001** indicator to the **J-21777-1** as follows:
    1. Loosely clamp the **GE-8001** indicator onto the stem on the **J-21777-1** .
    2. Place the contact pad of the **GE-8001** indicator onto the mounting post of the **J-21777-1** .
    3. With the contact pad of the **GE-8001** indicator touching the mounting post of the **J-21777-1** , loosen the lock nut on the **GE-8001** indicator and push down on the **GE-8001** indicator until the needle the **GE-8001** indicator has turned 3/4 of a turn clockwise.
    4. Tighten the clamp on the **GE-8001** indicator finger tight.

NOTE: **The deflection is the point where the needle changes direction.**

12. Move the plunger of the **J-21777-1** back and forth until the needle of the **GE-8001** indicator indicates the greatest deflection.

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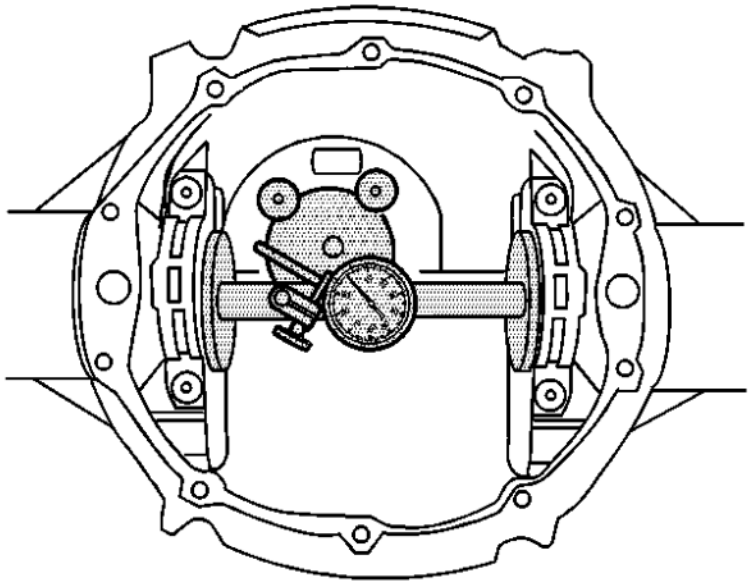


Fig. 244: Measuring Necessary Shim Thickness
Courtesy of GENERAL MOTORS COMPANY

13. At the greatest point of deflection, move the housing of the **GE-8001** indicator 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 **GE-8001** Dial Indicator Set as necessary to set the needle to zero.
15. Rotate the plunger of the **J-21777-1** away from the **J-45108** gauge plate.
16. The value indicated on the **GE-8001** indicator is the thickness of the shim needed in order to set the depth of the pinion.
17. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
18. Remove the pinion depth setting tools.
19. Remove the pinion bearings.
20. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.

PINION DEPTH ADJUSTMENT (9.76 INCH AXLE)

Special Tools

- **J 8001** Dial Indicator Set
- **J 34925** Pinion Setting Gauge Set
- **DT 51173** Gauge Plate

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

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NOTE: **Make sure all of the tools, the differential side bearing bores, and the pinion bearing cups are clean before proceeding.**

1. Using the proper axle lubricant, lubricant the differential pinion bearings. Refer to **Fluid and Lubricant Recommendations** .
2. Install the differential pinion bearings into the axle housing.

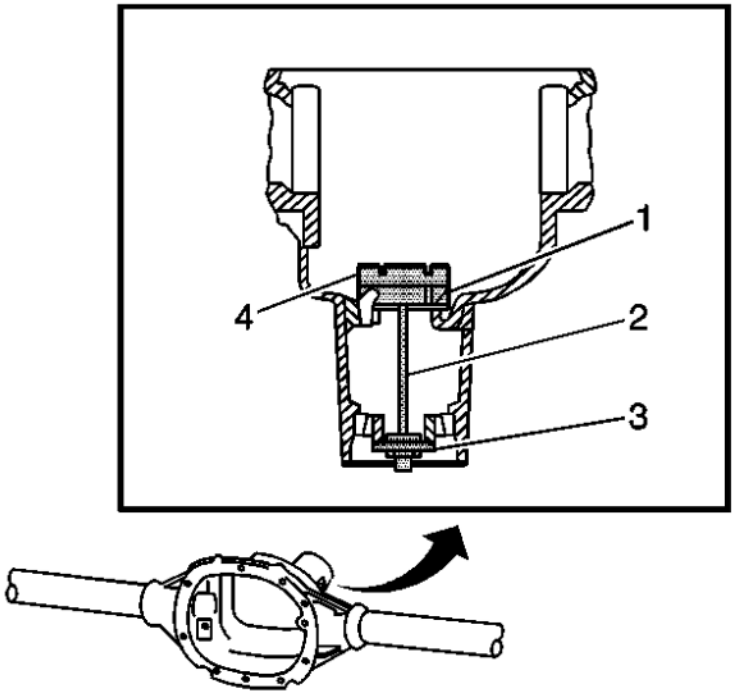


Fig. 245: Assembling Special Tools In Axle Housing
Courtesy of GENERAL MOTORS COMPANY

3. Install the **DT-51173-2** (1), the **J-21777-43** (2), the **DT-51173-3** (3), and the **DT 51173** plate (4) into the axle housing.

   Hold the **J-21777-43** stationary while turning the torque wrench.

   Rotate the assembly several times in both directions in order to seat the pinion bearings.

4. If the torque is less than 1.7 N.m (15 lb in), tighten the nut until a rotating torque of 1.7-2.3 N.m (15-20 lb in) is obtained.

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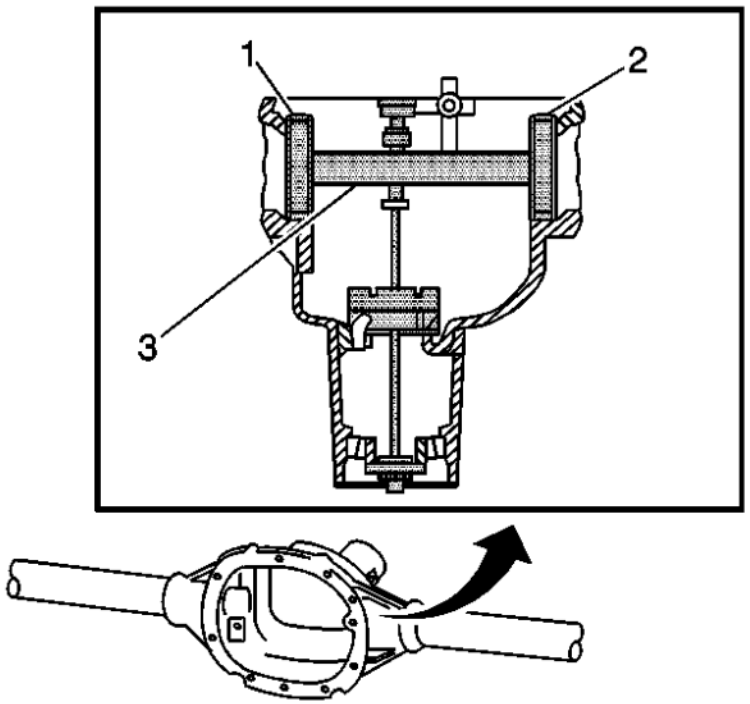


Fig. 246: Assembling Special Tools In Differential Carrier Bore
Courtesy of GENERAL MOTORS COMPANY

5. Install the **J-21777-86** (1 and 2) to the **J-21777-1** (3) in the differential carrier bores.
6. Install the bearing caps.

CAUTION: **Refer to Fastener Caution .**

7. Install the bearing cap bolts and tighten to 75 N.m (55 lb ft).
8. Rotate the **J-21777-1** within the **J-21777-86** .

The **J-21777-1** must rotate back and forth freely within the discs. If the **J-21777-1** does not rotate freely, disassemble the components, inspect for proper seating and/or mis-aligned components and re-assemble.

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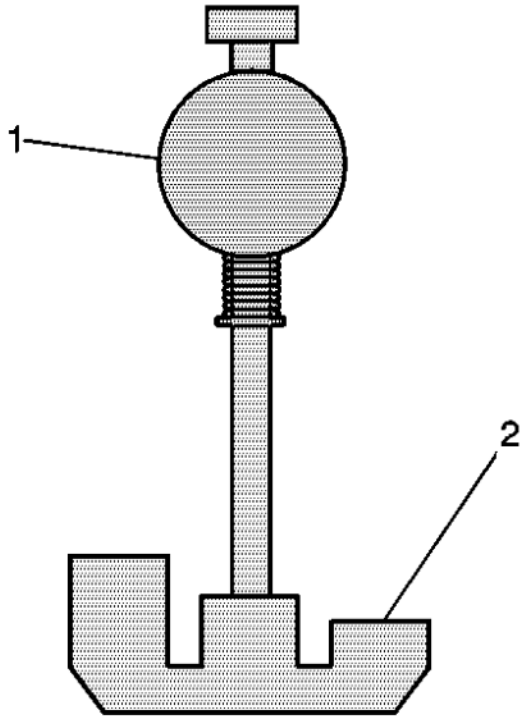


Fig. 247: Pinion Setting Gauge Set
Courtesy of GENERAL MOTORS COMPANY

9. Adjust the arbor of the **J-21777-1** (1) to the gauge block setting of the **DT-51173** plate.
10. Install the **GE-8001** indicator to the **J-21777-1** as follows:
    1. Loosely clamp the **GE-8001** indicator onto the stem on the **J-21777-1** .
    2. Place the contact pad of the **GE-8001** indicator onto the mounting post of the **J-21777-1** .
    3. With the contact pad of the **GE-8001** indicator touching the mounting post of the **J-21777-1** , loosen the lock nut on the **GE-8001** indicator and push down on the **GE-8001** indicator until the needle the **GE-8001** indicator has turned 3/4 of a turn clockwise.
    4. Tighten the clamp on the **GE-8001** indicator finger tight.

NOTE: **The deflection is the point where the needle changes direction.**

11. Move the plunger of the **J-21777-1** back and forth until the needle of the **GE-8001** indicator indicates the greatest deflection.

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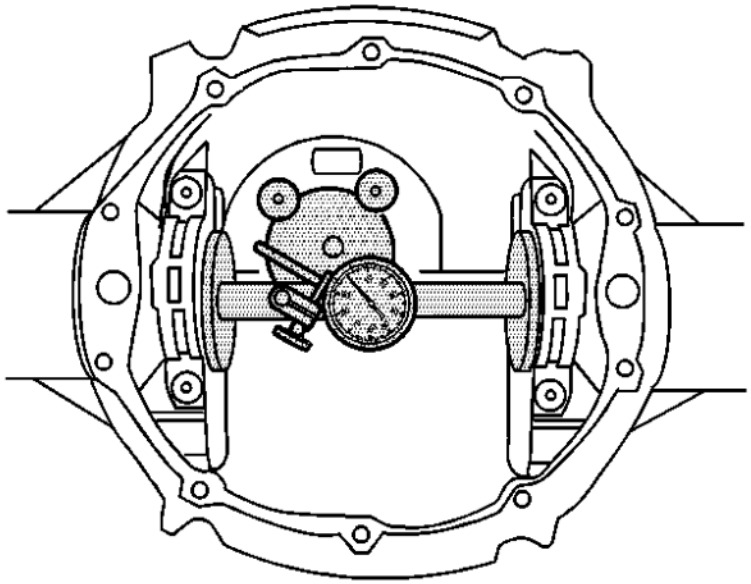


Fig. 248: Measuring Necessary Shim Thickness
Courtesy of GENERAL MOTORS COMPANY

12. At the greatest point of deflection, move the housing of the **GE-8001** indicator until the needle indicates zero.
13. Move the plunger of the **J-21777-1** back and forth again to verify the zero setting. Adjust the housing of the **J 8001** Dial Indicator Set as necessary to set the needle to zero.
14. Rotate the plunger of the **J-21777-1** away from the **DT-51173** gauge plate, until it no longer touches the **DT-51173** plate.
15. The value indicated on the **GE-8001** indicator is the thickness of the shim needed in order to set the depth of the pinion.
16. Select the shim that indicates the proper thickness. Measure the shim with a micrometer in order to verify that the thickness is correct.
17. Remove the pinion depth setting tools.
18. Remove the pinion bearings.
19. Install the pinion shim between the pinion gear and the inner pinion bearing. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.

DIFFERENTIAL CARRIER BEARING PRELOAD ADJUSTMENT (9.5/9.76 INCH AXLE)

Wedge Method

Special Tools

J-22779 Side Bearing Shim/Backlash Gauge

NOTE:

1. **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.**

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2. **The drive pinion bearing preload must be within specifications before the differential side bearing preload adjustment can be performed.**
3. **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.**
   - **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.**

WARNING: 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. Using an inch-pound torque wrench, measure the rotating torque of the drive pinion bearing. should be 1.7-3.4 N.m (15-30 lb in) for new bearings and 1.1-2.3 N.m (10-20 lb in) for used bearings.
3. If the rotating torque of the drive pinion is less than: 1.7 N.m (15 lb in) for new bearings or 1.1 N.m (10 lb in) for used bearings, tighten the pinion in small increments until the specified rotating torque is obtained.
4. If the rotating torque of the drive pinion is greater than 3.4 N.m (30 lb in) for new bearings or 2.3 N.m (20 lb in) for used bearings, replace the collapsible spacer. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.
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.

NOTE: 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.
8. Install the differential assembly with the differential side bearings and differential side bearing cups into the axle housing.
9. Insert one 4.318 mm (0.170 in) thick service spacer into the left side of the axle housing.
10. Side the differential assembly towards the service spacer in order to hold the spacer in place.

NOTE: The J-22779 gauge must be installed between the service spacer and the differential side bearing cup.

11. Install the **J-22779** gauge into the right side of the axle housing.

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

12. Tighten the knob on the **J-25588** installer until there is moderate drag when the **J-22779** gauge is moved.
13. Remove the **J-22779** gauge.
14. Remove the service spacer.

NOTE: Record the measurement.

15. Using a micrometer, measure the thickness of the service spacer.

NOTE: Record the measurement.

16. Using a micrometer, measure the thickness of the **J-22779** gauge in 3 locations. Calculate the average of the 3 measurements.
17. Add the thickness of the service spacer, measured in step 11 to the average thickness of the **J-22779** gauge, measured in step 12. The resulting value is the total service shim thickness without preload for the axle.

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18. 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.
19. Install the **J 22779** gauge into the left side of the axle housing. The **J 22779** gauge must be installed between the service spacer and the differential side bearing cup.
20. While rotating the ring gear back and forth, tighten the knob on the **J-22779** gauge until there is approximately 0.025-0.051 mm (0.001-0.002 in) of backlash between the ring gear and the drive pinion.
21. Once the correct amount of backlash is obtained, remove the **J -22779** gauge.
22. Remove the differential assembly with the differential side bearings and the differential side bearing cups.
23. Remove the BENT service shim.
24. Using a micrometer, measure the thickness of the **J-22779** gauge in 3 locations. Calculate the average of the 3 measurements. This value is the left side service shim thickness without preload.
25. 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 17, 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.
26. In order to preload of the differential side bearings and set the backlash to approximately 0.127-0.223 mm (0.005-0.009 in), take the value determined in step 21 and add 0.203 mm (0.008 in) service shim thickness to this amount.
27. 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 24. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.
28. 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 26. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.
29. Install the differential assembly with the differential side bearings and the differential side bearing cups.
30. 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.
31. Install the right side service spacer between the axle housing and the differential side bearing cup.
32. Install the right side service spacer into the axle housing using the a brass drift or rod. The service shim must then be installed between the service spacer and the differential side bearing cup.

CAUTION: **Refer to Fastener Caution .**

33. Install the differential bearing caps and the bolts and tighten to 85 N.m (63 lb ft).
34. Rotate the pinion several times to ensure the drive pinion and differential side bearings have seated.

NOTE: **Record the measurement.**

35. Using an inch pound torque wrench, measure the rotating torque of the drive pinion and differential side bearings which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
36. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in step 2, from the drive pinion and differential case bearing preload, measured in step 31. Multiply the value obtained by the axle ratio. The differential side bearing preload should be 1.7-4.0 N.m (15-35 lb in).
37. 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.
38. Once the differential side bearing preload is correct, measure the backlash and adjust, if necessary. Refer to **Backlash Adjustment (9.5/9.76 Inch Axle)**.
39. Once the differential side bearing preload and backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

Shim Method

NOTE:

- **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.**

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1. Install the drive pinion, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.

NOTE: **Record the measurement.**

2. Using an inch pound torque wrench, measure the rotating torque of the drive pinion which should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m (10-20 lb in) for used bearings.
3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.

NOTE: **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 4.575 mm (0.180 in) thick SERVICE SPACER into the left side axle housing.
7. Move the differential assembly to the right until the ring gear contacts the drive pinion. Once the ring gear contacts the drive pinion, continue to move the ring gear towards the drive pinion to until all backlash is removed.
8. While holding the ring gear against the drive pinion, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.
9. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.
10. Install the service shim that was just measured back into the left side of the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
11. Remove the BENT shim from the right side of the axle housing.
12. Insert one 4.575 mm (0.180 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.

NOTE: **Using a micrometer, verify the thickness of the service shim. Measure the service shim in 3 locations.**

16. Select the correct service shim thickness for each side corresponding to the measurements determined above. Calculate the average of the 3 measurements. Use the average as the thickness for the shim.

NOTE: **The service shim must be installed between the service spacer and the differential side bearing cup.**

17. Install the left side service spacer and shim into the axle housing.
18. Move the differential assembly towards the left side of the axle housing.
19. Install the right side service shim.
    1. Using a brass drift or rod, install the right side service spacer into the axle housing.

CAUTION: **Refer to Fastener Caution .**

20. Install the differential bearing caps and bolts and tighten to 85 N.m (63 lb ft).
21. Rotate the pinion several times to ensure the bearings have seated.
22. Using an inch-pound torque wrench, measure the rotating torque of drive pinion and differential case side bearings which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.

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23. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in Step 2, from the drive pinion and the differential case bearing preload, measured in Step 22. Multiply the value obtained by the axle ratio. 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 (9.5/9.76 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**.

Part Name	Metric Width	Tolerance	English Width	Tolerance
Â	Â	Plus/Minus	Â	Plus/Minus
Spacer	4.575 mm	2.5 mm	0.180 in	0.0098 in
Shim	1.016 mm	0.013 mm	0.040 in	0.0005 in
Shim	1.067 mm	0.013 mm	0.042 in	0.0005 in
Shim	1.118 mm	0.013 mm	0.044 in	0.0005 in
Shim	1.168 mm	0.013 mm	0.046 in	0.0005 in
Shim	1.219 mm	0.013 mm	0.048 in	0.0005 in
Shim	1.27 mm	0.013 mm	0.050 in	0.0005 in
Shim	1.321 mm	0.013 mm	0.052 in	0.0005 in
Shim	1.372 mm	0.013 mm	0.054 in	0.0005 in
Shim	1.422 mm	0.013 mm	0.056 in	0.0005 in
Spacer	4.575 mm	2.5 mm	0.180 in	0.0098 in
Shim	1.473 mm	0.013 mm	0.058 in	0.0005 in
Shim	1.524 mm	0.013 mm	0.060 in	0.0005 in
Shim	1.575 mm	0.013 mm	0.062 in	0.0005 in
Shim	1.626 mm	0.013 mm	0.064 in	0.0005 in
Shim	1.676 mm	0.013 mm	0.066 in	0.0005 in
Shim	1.727 mm	0.013 mm	0.068 in	0.0005 in
Shim	1.778 mm	0.013 mm	0.070 in	0.0005 in
Shim	1.829 mm	0.013 mm	0.072 in	0.0005 in
Shim	1.88 mm	0.013 mm	0.074 in	0.0005 in
Shim	1.93 mm	0.013 mm	0.076 in	0.0005 in

DIFFERENTIAL CARRIER BEARING PRELOAD ADJUSTMENT (8.6 INCH AXLE)

Wedge Method

Special Tools

- **J 25588** Side Bearing Shim Installer
- **J 22779** Side Bearing Backlash Gauge

NOTE:

- **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.**

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1. Install the drive pinion, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.

NOTE: **Record the measurement for re-assembly.**

2. Using an inch pound torque wrench, measure the rotating torque of the drive pinion, it should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m (10-20 lb in) for used bearings.
3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.

NOTE: **Before installation of the differential assembly, ensure that the differential side bearing surfaces in the axle housing are clean and free of burrs. If the original differential side bearings are to be reused, the original differential side bearing cups must also be used.**

4. Install the differential assembly with the differential side bearings and differential side bearing cups into the axle housing.
5. Insert one 4.318 mm (0.170 in) thick service spacer into the left side of the axle housing.
6. Side the differential assembly towards the service spacer in order to hold the spacer in place.

NOTE: **The J 22779 gauge must be installed between the service spacer and the differential side bearing cup.**

7. Install the **J 22779** gauge into the right side of the axle housing.

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

8. Tighten the knob on the **J 25588** installer until there is moderate drag when the **J 22779** gauge is moved.
9. Remove the **J 22779** gauge.
10. Remove the service spacer.

NOTE: **Record the measurement.**

11. Using a micrometer, measure the thickness of the service spacer.

NOTE: **Record the measurement.**

12. Using a micrometer, measure the thickness of the **J 22779** gauge in 3 locations. Calculate the average of the 3 measurements.
13. Add the thickness of the service spacer, measured in step 11 to the average thickness of the **J 22779** gauge, measured in step 12. The resulting value is the total service shim thickness without preload for the axle.
14. Insert one BENT 1.016 mm (0.040 in) service shim between the right side differential side bearing cup and the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
15. Install the **J 22779** gauge into the left side of the axle housing. The **J 22779** gauge must be installed between the service spacer and the differential side bearing cup.
16. While rotating the ring gear back and forth, tighten the knob on the **J 22779** gauge until there is approximately 0.025-0.051 mm (0.001-0.002 in) of backlash between the ring gear and the drive pinion.
17. Once the correct amount of backlash is obtained, remove the **J 22779** gauge.
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** gauge in 3 locations. Calculate the average of the 3 measurements. This value is the left side service shim thickness without preload.
21. In order to determine the right side service shim thickness, subtract the service shim thickness for the left side of the axle, calculated in step 20, from the total service shim thickness, calculated in step 13. This value is the service shim thickness for the right side of the axle without preload.
22. In order to preload of the differential side bearings and set the backlash to approximately 0.127-0.223 mm (0.005-0.009 in), take the value determined in step 21 and add 0.203 mm (0.008 in) service shim thickness to this amount.
23. Assemble the left side shim pack using one 4.318 mm (0.170 in) service spacer and the appropriate amount of service shims equaling the thickness determined in step 20. Measure the service spacer and the service shims separately. Add the measurements together in order to determine the total shim pack thickness.

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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** installer, if necessary. The service shim must be installed between the service spacer and the differential side bearing cup.

CAUTION: **Refer to Fastener Caution .**

29. Install the differential bearing caps and the bolts and tighten to 75 N.m (55 lb ft).
30. Rotate the pinion several times to ensure the drive pinion and differential side bearings have seated.

NOTE: **Record the measurement.**

31. Using an inch pound torque wrench, measure the rotating torque of the drive pinion and differential side bearings which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
32. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in step 2, from the drive pinion and differential case bearing preload, measured in step 31. Multiply the value obtained by the axle ratio. 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)**.
35. Once the differential side bearing preload and backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

Shim Method

Special Tools

J 25588 Side Bearing Shim Installer

NOTE:

- **The differential side bearings must have preload before the backlash adjustment can be started.**
- **In order to maintain the original backlash, adjust the differential case side bearing preload by changing the thickness of the left and the right side shim packs equally.**
- **Measure the service shims and the service spacers one at a time. Add the measurements together in order to obtain the total thickness of the left or the right side shim pack.**
- **Do not use or reuse the original cast iron production shims. Use service shims and service spacers instead.**

1. Install the drive pinion, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.

NOTE: **Record the measurement.**

2. Using an inch pound torque wrench, measure the rotating torque of the drive pinion which should be 1.7-3.4 N.m (15-30 lb in) for new bearings or 1.1-2.3 N.m (10-20 lb in) for used bearings.
3. If the rotating torque for the drive pinion bearings is not within specifications, adjust as necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**.

NOTE: **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.

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6. While holding the differential assembly against the bent service shim, install one 4.318 mm (0.170 in) thick service spacer into the left side axle housing.
7. Move the differential assembly to the right until the ring gear contacts the drive pinion. Once the ring gear contacts the drive pinion, continue to move the ring gear towards the drive pinion to until all backlash is removed.
8. While holding the ring gear against the drive pinion, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.
9. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.
10. Install the service shim that was just measured back into the left side of the axle housing. The service shim must be installed between the service spacer and the differential side bearing cup.
11. Remove the BENT shim from the right side of the axle housing.
12. Insert one 4.318 mm (0.170 in) thick service spacer into the right side axle housing.
13. Move the differential assembly towards the left side of the axle housing. While holding the differential assembly against the left side shim pack, insert progressively larger service shims between the service spacer and the differential side bearing cup until a moderate resistance can be felt.
14. Once the largest service shim has been determined, measure the thickness of the shim using a micrometer. Verify the thickness of the service shim. Measure the service shim in 3 locations. Calculate the average of the 3 measurements. Use the average as the thickness for the shim. Record the measurement.
15. In order to preload the differential side bearing and set the initial backlash to approximately 0.127 mm (0.005 in), adjust the thickness of left and right side shims by doing the following:
    1. Subtract 0.152 mm (0.006 in) from the measurement recorded for the left side shim in step 9. Record the measurement.
    2. Add 0.356 mm (0.014 in) to the measurement recorded for the right side shim in step 14.

NOTE: **Using a micrometer, verify the thickness of the service shim. Measure the service shim in 3 locations.**

16. Select the correct service shim thickness for each side corresponding to the measurements determined above. Calculate the average of the 3 measurements. Use the average as the thickness for the shim.

NOTE: **The service shim must be installed between the service spacer and the differential side bearing cup.**

17. Install the left side service shim into the axle housing.
18. Move the differential assembly towards the left side of the axle housing.

NOTE: **The service shim must be installed between the service spacer and the differential side bearing cup**

19. Using the **J 25588** installer, install the right side service shim into the axle housing..

CAUTION: **Refer to Fastener Caution .**

20. Install the differential bearing caps and bolts and tighten to 75 N.m (55 lb ft).
21. Rotate the pinion several times to ensure the bearings have seated.
22. Using an inch-pound torque wrench, measure the rotating torque of drive pinion and differential case side bearings which should be 0.57-1.13 N.m (5-10 lb in) greater than the rotating torque of the drive pinion measured earlier.
23. Calculate the differential side bearing preload by subtracting the drive pinion preload, measured in Step 2, from the drive pinion and the differential case bearing preload, measured in Step 23. Multiply the value obtained by the axle ratio. 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)**.
26. Once backlash and differential side bearing preload is within specifications, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

DIFFERENTIAL CARRIER BEARING PRELOAD ADJUSTMENT (10.5 INCH AXLE)

Special Tools

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J-24429 Side Bearing Backlash Spanner

NOTE:

- **The differential side bearing preload is adjusted by the 2 adjusting nuts in the bearing bore. The bore and the bearing cap provide the mating threads for the bearing nut.**
- **The differential must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.**
- **The rotating torque of the drive pinion must be within specifications before the pinion gear bearing retainer can be installed.**

1. Install the pinion gear bearing retainer or the drive pinion, for the 10.5. Refer to **Differential Drive Pinion Gear Bearing Retainer Replacement (10.5 Inch Axle)**.
2. Install the differential drive pinion. Refer to **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
3. Install the differential side bearings, if necessary. Refer to **Differential Bearing Replacement**.
4. Install the differential side bearing adjuster nuts.

   NOTE: **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.**

   NOTE: **If the differential case assembly cannot be installed, turn the differential side bearing adjuster nuts into the axle housing until the differential case assembly can be installed.**

5. Install the differential case assembly.

   NOTE: **Tighten the bearing cap bolt finger-tight. DO NOT torque the bearing cap bolts at this time.**

6. Install the differential bearing caps and bolts.

   NOTE: **Do not force the differential ring gear into contact with the drive pinion.**

   NOTE: **If the zero backlash cannot be obtained, turn the right side differential bearing adjuster nut in towards the rear axle housing until the differential ring gear fully contacts the drive pinion to obtain the zero backlash.**

7. To establish the zero backlash point, slide the differential case assembly towards the right side axle housing until the ring gear contact the pinion.
8. Using the **J-24429** spanner and holding the holding the differential ring gear against the drive pinion, turn the left differential bearing adjuster nut out from the axle housing until it contacts the differential side bearing.
9. Using the **J-24429** spanner, turn the right differential bearing adjuster nut out from the axle housing until it contacts the differential side bearing.
10. Using the **J-24429** spanner, back off the left adjusting nut approximately 2 slots in order to obtain the initial backlash adjustment.

    NOTE: **Do not torque the adjuster lack bolt at this time.**

11. Install the left adjuster nut lock and the adjuster nut lock bolt.
12. Using the **J-24429** spanner, firmly tighten the right differential bearing adjuster nut in order to force the differential case assembly into solid contact with the left differential adjuster nut.
13. Rotate the pinion several times in order to seat the bearings.
14. Using the **J-24429** spanner, loosen the right differential bearing adjuster nut until the nut is free from the differential side bearing.
15. Using the **J-24429** spanner, tighten the right differential bearing adjuster nut until the differential bearing adjuster nut contacts the bearing.
16. Once the right differential bearing adjuster contacts the differential bearing, tighten the differential bearing adjuster nut. using the **J-24429** spanner the following additional amounts:
17. Using the **J-24429** spanner, tighten the differential bearing adjuster nut an additional 2 slots for used bearings or an additional 3 slots for new bearings.
18. Install the right differential bearing adjuster nut lock.

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NOTE: **Do not torque the bolt at this time.**

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

CAUTION: **Refer to Fastener Caution .**

20. Tighten the bearing cap bolts to 185 N.m (136 lb ft). for the 8.6 inch axle or 207 N.m (153 lb ft) for the 11.5 inch axle.
21. Tighten differential bearing adjuster nut lock bolts to 27 N.m (20 lb ft).
22. Measure the ring gear to pinion backlash and adjust, if necessary. Refer to **Backlash Adjustment (10.5 Inch Axle)**.

WHEEL BEARING ADJUSTMENT (10.5 INCH AXLE)

Preliminary Inspection

NOTE: **The preceding information is a General Inspection Procedure. If there are hub seal leaks, brake related noise, vibration or wear issues, the wheel bearing end play should be measured to ensure it is within the acceptable range as noted below.**

NOTE: **Ensure the brakes are fully released and do not drag.**

Pull or push the tire at the top back and forth in order to test the wheel bearing play.

- Use a pry bar under the tire as an alternative.
- If the wheel bearing adjustment is correct, the movement will be barely noticeable.
- If the movement is excessive, adjust the bearings.

Adjustment Procedure

NOTE: **There are two different style of wheel bearing nut wrenches to match the different style of adjusting nuts and they are NOT interchangeable. Use the correct wrench when adjusting the wheel bearing.**

Special Tools

- **CH 49794** Wheel Bearing Nut Wrench
- **CH 50636** Wheel Bearing Nut Wrench

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

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the axle shaft. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**.

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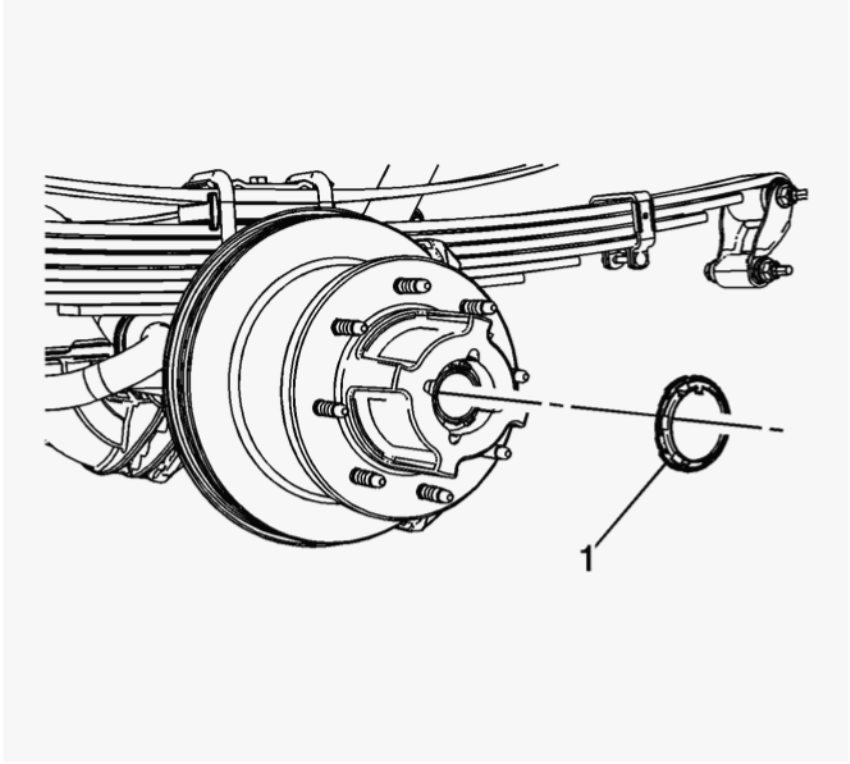


Fig. 249: Adjuster Nut Retainer
Courtesy of GENERAL MOTORS COMPANY

3. Remove the adjuster nut retainer (1).

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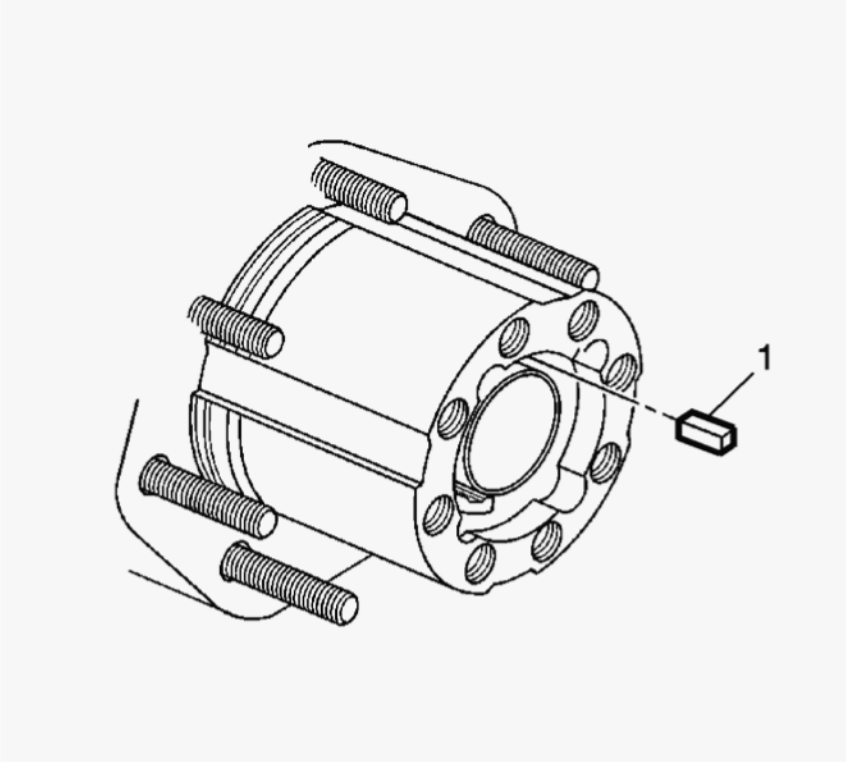


Fig. 250: Adjuster Nut Lock Key
Courtesy of GENERAL MOTORS COMPANY

4. Remove the adjuster nut lock key (1).

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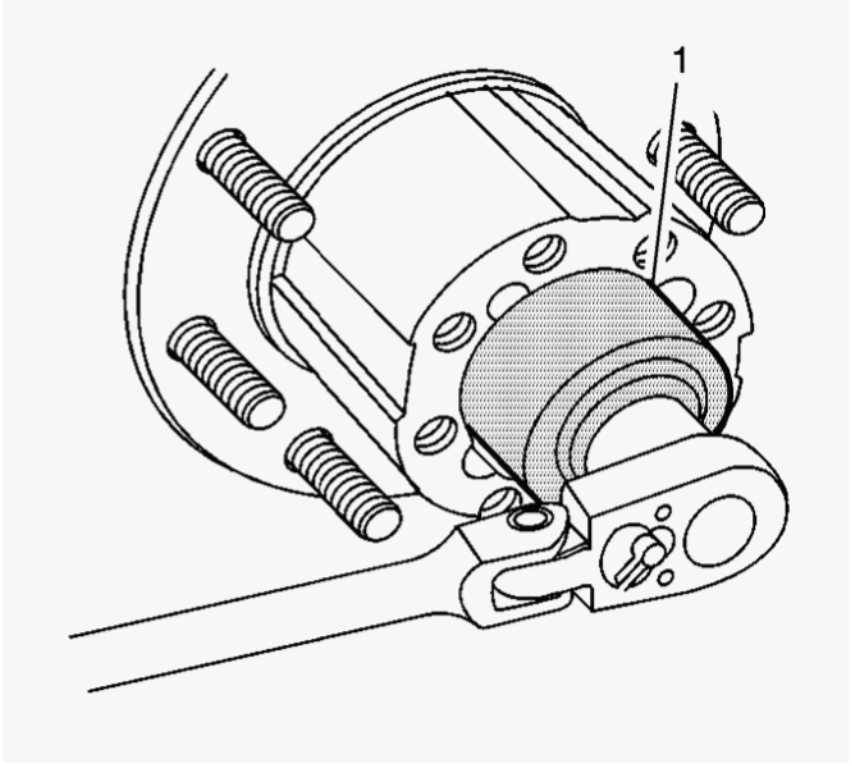


Fig. 251: Wheel Hub Assembly And Special Tool
Courtesy of GENERAL MOTORS COMPANY

CAUTION: **Refer to Fastener Caution .**

NOTE: **If the wheel hub assembly DOES NOT fully seat itself onto the axle shaft and is removed, the wheel hub seal must be replaced.**

5. Using the **CH 49794** wrench or the **CH 50636** wrench (1), tighten the wheel bearing adjusting nut:
   - Rotate the hub in the opposite direction to the way the adjuster nut is turning.
   - Ensure that the inner bearing and the seal are completely seated against the axle shoulder.
   - Tighten the adjusting nut to 70 N.m (52 lb ft).
6. Using the **CH 49794** wrench or the **CH 50636** wrench (1), turn the adjusting nut counterclockwise until the nut is loose.

NOTE: **Torque on the nut must be zero to finger tight.**

7. Turn the adjusting nut clockwise until the nut contacts the bearing cone.

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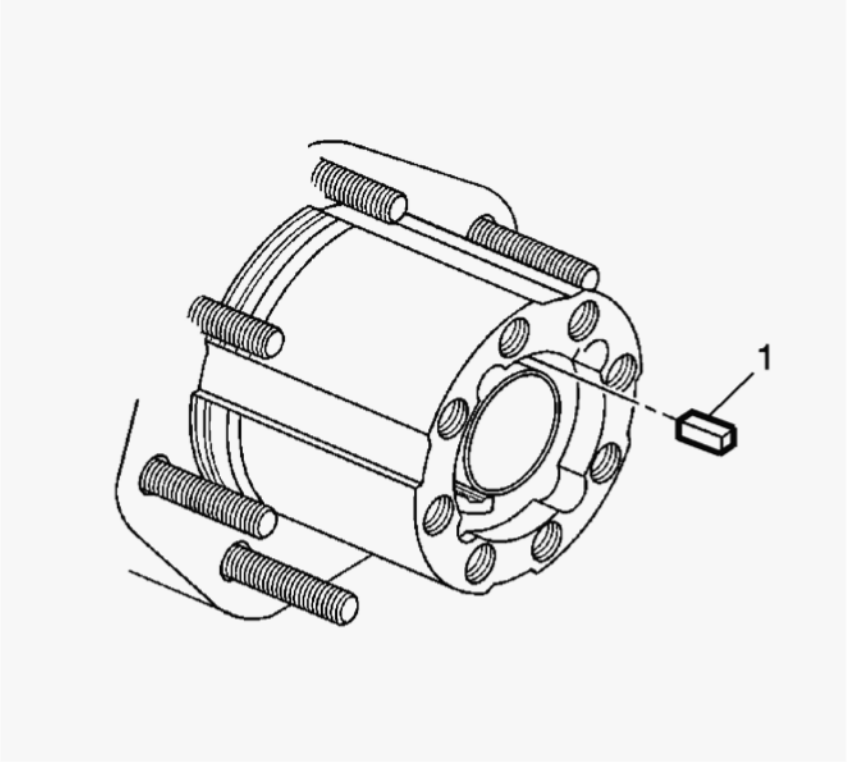


Fig. 252: Adjuster Nut Lock Key
Courtesy of GENERAL MOTORS COMPANY

8. Install the rear wheel bearing adjusting nut key (1).

NOTE: **Do not turn the adjusting nut more than one slot counterclockwise to align the adjusting nut slot with the keyway in the axle.**

9. If the rear wheel bearing adjusting nut key (1) can not be installed, turn the rear wheel bearing adjusting nut (1) counterclockwise until the rear wheel bearing adjusting nut (1) and the keyway in the axle are aligned.

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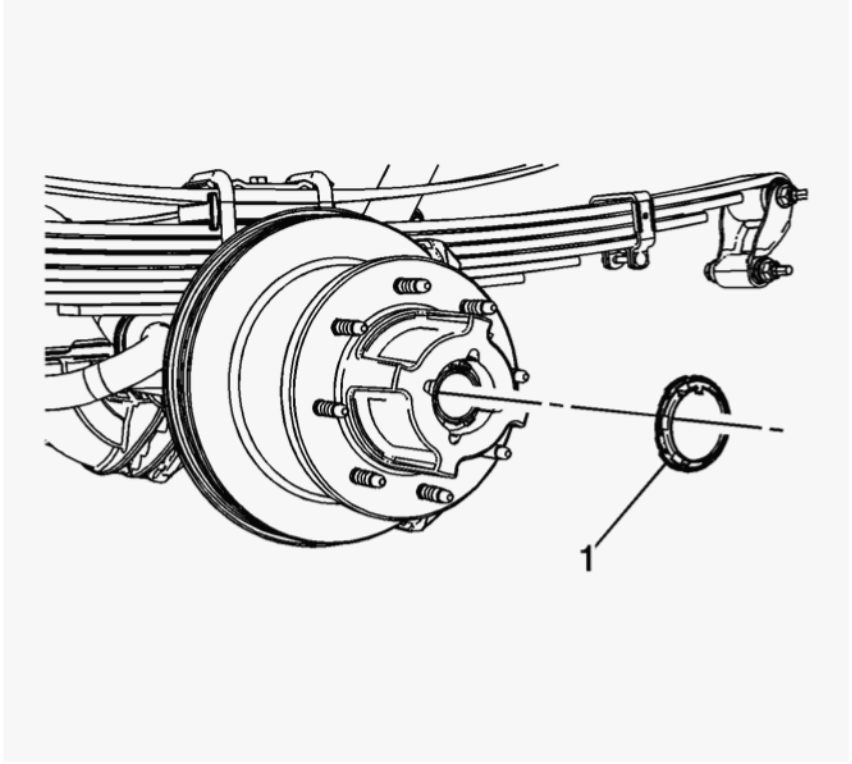


Fig. 253: Adjuster Nut Retainer
Courtesy of GENERAL MOTORS COMPANY

10. Install the adjuster nut retainer (1).

NOTE: **A magnetic dial indicator base can be mounted on the end of the axle spindle tube and still allow the hub to rotate. A dial indicator can be positioned against the face of the axle shaft mounting flange on the rear wheel hub. The indicator probe must be positioned perpendicular (i.e. 90 degrees to the hub face) to obtain accurate readings. Alternately, the dial indicator magnetic base can be mounted on the axle shaft mounting flange of the rear wheel hub and the dial indicator probe can be positioned against the end of the axle spindle tube. Either way is acceptable and both methods can be used to measure hub endplay. When pushing and pulling axially on the hub to measure the endplay, it is helpful if the hub is rotated several degrees clockwise and counterclockwise to ensure that the bearings are being properly seated and seal friction is minimized. It is necessary to provide a relatively high amount of force, by hand, to the hub when pushing and pulling to ensure that the load on the hub overcomes the effects of the weight of the hub and the friction in the inner bearing seal. Rocking the hub using a pry bar does not properly load the hub and provides an inaccurate reading of endplay. The dial indicator base and indictor probe must be positioned as close to the centerline of the rear axle spindle and hub as possible to minimize any effects caused by tilting of the hub when pushing or pulling axially on the hub to obtain measurements.**

11. Use appropriate tool setup to measure hub endplay. Bearing should be adjusted for clearance between 0.025-0.25 mm (0.001-0.010 in).
12. Install the rear axle shaft. Refer to **Rear Axle Shaft and Gasket Replacement (10.5 Inch Axle)**.
13. Inspect the lubricant level and add, if necessary. Refer to **Rear Axle Lubricant Level Inspection (10.5 Inch Axle)**.
14. Lower the vehicle.

BACKLASH ADJUSTMENT (9.5/9.76 INCH AXLE)

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Special Tools

- **J 8001** Dial Indicator Set
- **J 25025** Guide Pins

NOTE:

- **Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.**
- **The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.**
- **Mark the bearing caps left or right sides**

1. Measure the rotating torque of the drive pinion and differential assembly. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.

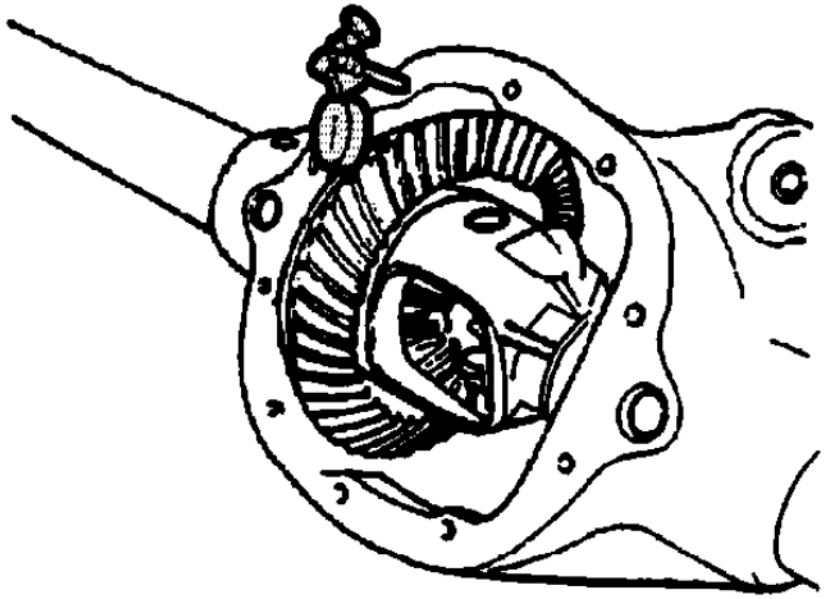


Fig. 254: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS COMPANY

2. Install the **J 25025** pins and the **J 8001** indicator to the axle housing.

NOTE: **Preload the dial of the J 8001-3 indicator approximately 3/4 of a turn and zero the gauge.**

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3. Set the **J 8001-3** indicator so that the stem is aligned with the gear rotation and square to the tooth angle.
4. Hold the drive pinion stationary, move the ring gear back and forth.
5. Repeat the measuring procedure at eight points around the ring gear.
6. 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 burrs, a distorted case flange or uneven bolting.
8. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point measured should be 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).

NOTE: **Increasing or decreasing the shim thickness by 0.05 mm (0.002 in) will change the backlash adjustment approximately 0.03 mm (0.001 in).**

9. Calculate the average of the 3 measurements.

NOTE:
- **If the backlash is less than, select a smaller shim than the one that was removed. For example, to INCREASE the backlash by 0.05 mm (0.002 in), select a shim that is 0.10 mm (0.004 in) thinner than the shim that was removed.**
- **If the backlash is larger than, select a larger shim than the one that was removed. For example, to DECREASE the backlash by 0.05 mm (0.002 in), select a shim that is 0.10 mm (0.004 in) thicker than the shim that was removed.**

10. Install the selected shim.

CAUTION: **Refer to Fastener Caution .**

11. If the backlash is too small, increase the backlash using the following procedure:
    1. Remove the bearing cap bolts and the bearing caps.

    NOTE: **Mark the bearing cups and the shims left or right.**

    2. Remove the differential case assembly with the bearing cups and the shims.

    NOTE:
    - **Measure the production shim or the shim and service spacer in 3 locations.**
    - **Measure each shim separately.**

    3. Measure the thickness of left side shim pack.

    NOTE:
    - **Add the average of each of the shim measurements together.**
    - **Record the measurement. This is the thickness for the left side shim pack**

    4. Calculate the average of the 3 measurements for each shim.

    NOTE: **If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004) in of thickness from the left side shim pack**

    5. Assemble a new left side shim pack by decreasing the appropriate amount of thickness from the original left side shim pack.

    NOTE: **Measure each shim separately.**

    6. Measure the thickness of right side shim or the shim and service spacer in 3 locations.

    NOTE:
    - **Add the average of each of the shim measurements together.**

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- **Record the measurement. This is the thickness for the right side shim pack.**

7. Calculate the average of the 3 measurements for each shim.
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.

12. Use the following procedure to decrease the backlash if the backlash is too large:
    1. Remove the bearing cap bolts and the bearing caps.

    NOTE: **Mark the bearing cups and the shims left or right.**

    2. Remove the differential case assembly with the bearing cups and the shims.

    NOTE:
    - **Measure the production shim or the shim and service spacer in 3 locations.**
    - **Measure each shim separately.**

    3. Measure the thickness of left side shim pack.

    NOTE:
    - **Add the average of each of the shim measurements together.**
    - **Record the measurement. This is the thickness for the left side shim pack.**

    4. Calculate the average of the 3 measurements for each shim.
    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.

    NOTE:
    - **Measure the shim or the shim and service spacer in 3 locations.**
    - **Measure each shim separately.**

    6. Measure the thickness of right side shim pack.

    NOTE:
    - **Add the average of each of the shim measurements together.**
    - **Record the measurement. This is the thickness for the right side shim pack.**

    7. Calculate the average of the 3 measurements for each shim.
    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.
13. Install the differential case assembly with the bearing cups.
14. Install the left side service shims between the axle housing and the differential case.
15. Install the right side service shims between the axle housing and the differential case.

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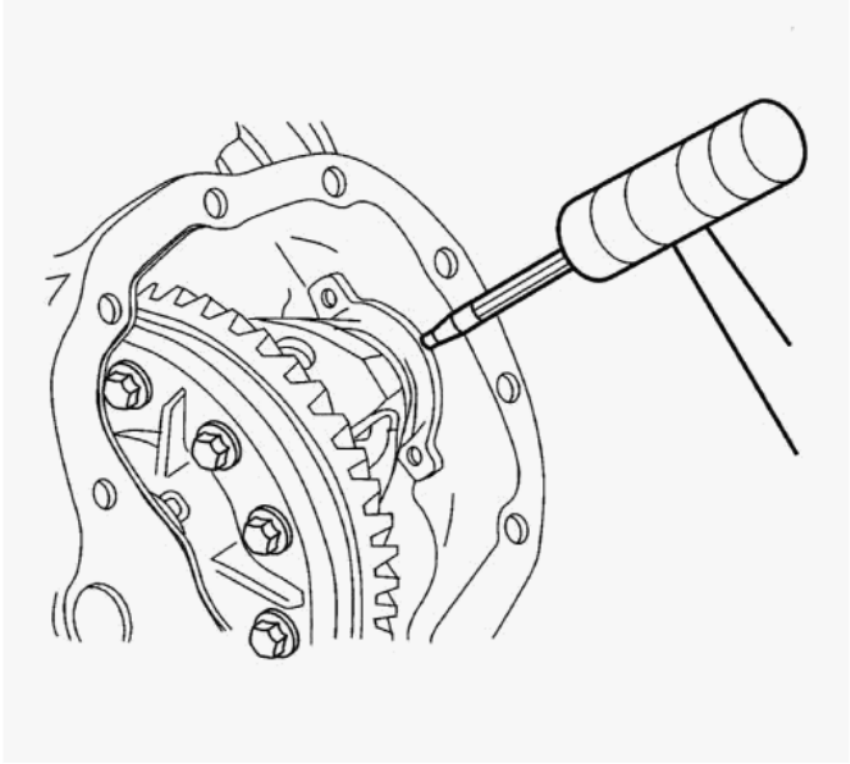


Fig. 255: Install Service Spacers Using Brass Drift
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The service spacers must be installed between the service shim (s) and the axle housing.**

16. Using the brass drift for 9.5/9.76 axle, install the left side service spacer
17. Using the brass drift for 9.5/9.76 axle, install the right side service spacer
18. Install the bearing caps and bolts and tighten to 85 N.m (63 lb ft).
19. Recheck the backlash and adjust, if necessary.
20. 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**.

NOTE: **Recheck the backlash following the steps above to verify that the backlash is within specifications.**

21. Tighten the differential bearing cap bolts to 85 N.m (63 lb ft).
22. Measure the drive pinion and differential case side bearing preload and adjust, if necessary following the steps above.
23. Once the backlash and bearing preload is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

BACKLASH ADJUSTMENT (8.6 INCH AXLE)

Special Tools

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- **J 8001** Dial Indicator Set
- **J 25025-1** Guide Pins
- **J 25588** Side Bearing Shim Installer

NOTE:

- **Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.**
- **The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.**

1. Measure the rotating torque of the drive pinion and differential assembly. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.

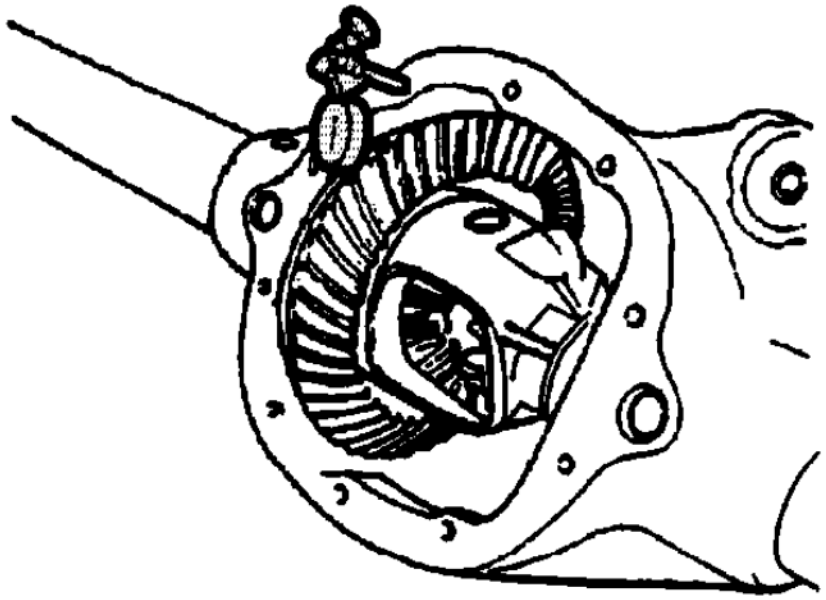


Fig. 256: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS COMPANY

2. Install the **J 25025** pins and the **J 8001** indicator to the axle housing.

NOTE: **Preload the dial of the approximately 3/4 of a turn and zero the gauge.**

3. Set the **J 8001** indicator so that the stem is aligned with the gear rotation and square to the tooth angle.

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4. Hold the drive pinion stationary, move the ring gear back and forth.
5. Repeat the measuring procedure at eight points around the ring gear.
6. 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 burrs, a distorted case flange or uneven bolting.
8. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point measured should be 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).

NOTE:
- **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:

NOTE: **Mark the bearing caps left or right.**

1. Remove the bearing cap bolts and the bearing caps.

NOTE: **Mark the bearing cups and the shims left or right.**

2. Remove the differential case assembly with the bearing cups and the shims.

NOTE:
- **Measure the production shim or the shim and service spacer in 3 locations.**
- **Measure each shim separately.**

3. Measure the thickness of left side shim pack.

NOTE:
- **Add the average of each of the shim measurements together.**
- **Record the measurement. This is the thickness for the left side shim pack.**

4. Calculate the average of the 3 measurements for each shim.

NOTE: **If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004 in) of thickness from the left side shim pack.**

5. Assemble a new left side shim pack by decreasing the appropriate amount of thickness from the original left side shim pack.

NOTE: **Measure each shim separately.**

6. Measure the thickness of right side shim or the shim and service spacer in 3 locations.

NOTE:
- **Add the average of each of the shim measurements together.**
- **Record the measurement. This is the thickness for the right side shim pack.**

7. Calculate the average of the 3 measurements for each shim.
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.

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10. Use the following procedure to decrease the backlash if the backlash is too large:

NOTE: **Mark the bearing caps left or right.**

1. Remove the bearing cap bolts and the bearing caps.

NOTE: **Mark the bearing cups and the shims left or right.**

2. Remove the differential case assembly with the bearing cups and the shims.

NOTE:
- **Measure the production shim or the shim and service spacer in 3 locations.**
- **Measure each shim separately.**

3. Measure the thickness of left side shim pack.

NOTE:
- **Add the average of each of the shim measurements together.**
- **Record the measurement. This is the thickness for the left side shim pack.**

4. Calculate the average of the 3 measurements for each shim.
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.

NOTE:
- **Measure the shim or the shim and service spacer in 3 locations.**
- **Measure each shim separately.**

6. Measure the thickness of right side shim pack.

NOTE:
- **Add the average of each of the shim measurements together.**
- **Record the measurement. This is the thickness for the right side shim pack.**

7. Calculate the average of the 3 measurements for each shim.
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.

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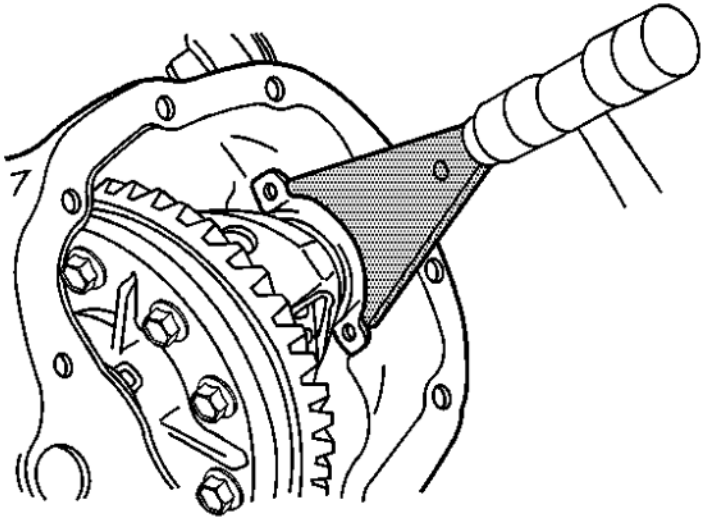


Fig. 257: Installing Service Shim
Courtesy of GENERAL MOTORS COMPANY

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

14. Using the **J 25588** installer, install the left side service shim or shims.

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

15. Using the **J 25588** installer, install the right side service shim or shims.

CAUTION: **Refer to Fastener Caution .**

16. Install the bearing caps and bolts and tighten to 75 N.m (55 lb ft).
17. Recheck the backlash and adjust, if necessary.
18. Once backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to **Gear Tooth Contact Pattern Inspection**.

BACKLASH ADJUSTMENT (10.5 INCH AXLE)

Special Tools

- **J 8001** Dial Indicator Set
- **J 24429** Side Bearing Backlash Spanner

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- **J 25025** Guide Pins

NOTE:

- **Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.**
- **The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.**

1. Measure the rotating torque of the drive pinion and differential assembly. Refer to **Differential Drive Pinion Gear Bearing Replacement (10.5 Inch Axle)**.

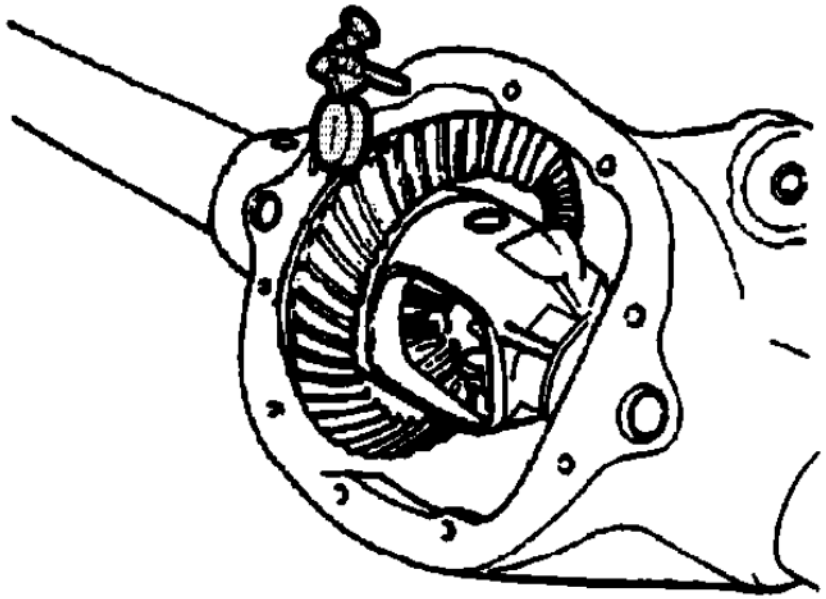


Fig. 258: Measuring Ring Gear Backlash
Courtesy of GENERAL MOTORS COMPANY

2. Install the **J 8001** indicator and the **J 25025** pins to the axle housing.
3. Place the indicator stem of the **J 8001** indicator at the heel end of a gear tooth.

NOTE: **Preload the dial of the J 8001 indicator approximately a turn and zero the gauge.**

4. Set the **J 8001** indicator so that the stem is aligned with the gear rotation and square to the tooth angle.
5. Hold the drive pinion stationary, move the ring gear back and forth.

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6. Repeat the measuring procedure at eight points around the ring gear.
7. The difference between the backlash at all of the measuring points should not vary by more than 0.05 mm (0.002 in).
8. If the difference between the backlash at all of the measuring points varies by more than 0.05 mm (0.002 in), inspect for burrs, distorted case flange or uneven bolting.
9. If the difference between all the measuring points is within specifications, the backlash at the 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) at the minimum lash point.

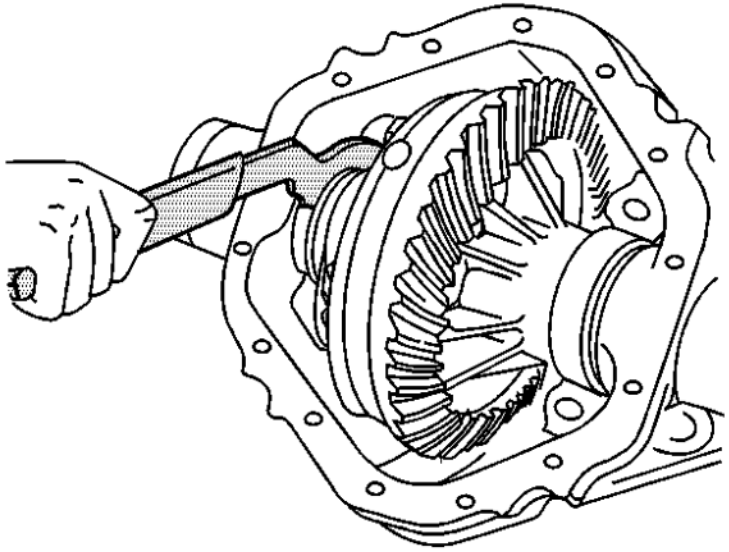


Fig. 259: Turning Adjusters
Courtesy of GENERAL MOTORS COMPANY

10. If the backlash is not within specifications, remove the differential bearing adjuster nut retainers bolts.
11. Remove the differential bearing adjuster nut retainers.
12. Remove the bearing cap bolts.

NOTE: **Before removing the bearing caps, mark the bearing caps left and right.**

13. Remove the bearing caps.
14. If the backlash is less than, use the **J 24429** spanner to increase the backlash by turning the left differential bearing adjuster in one slot and the right differential bearing adjuster out one slot until the correct backlash is obtained.
15. If the backlash is greater than, use the **J 24429** spanner to decrease the backlash by turning the right differential bearing adjuster in one slot and the left differential bearing adjuster out one slot until the correct backlash is obtained.
16. Install the bearing caps.

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CAUTION: **Refer to Fastener Caution .**

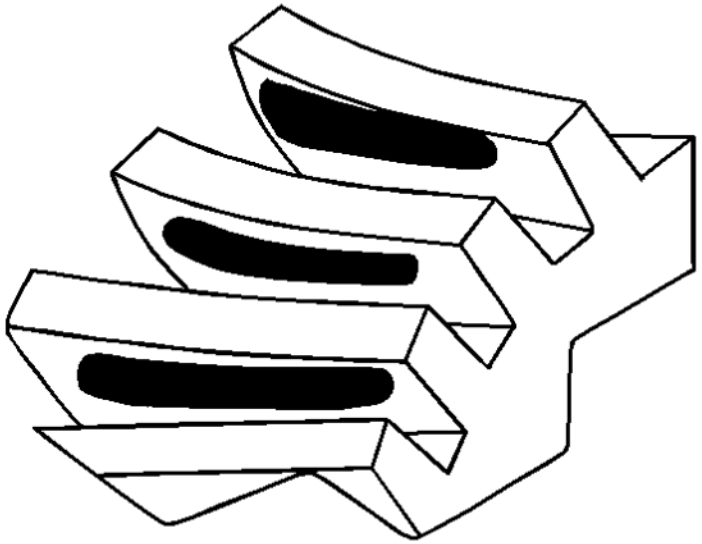
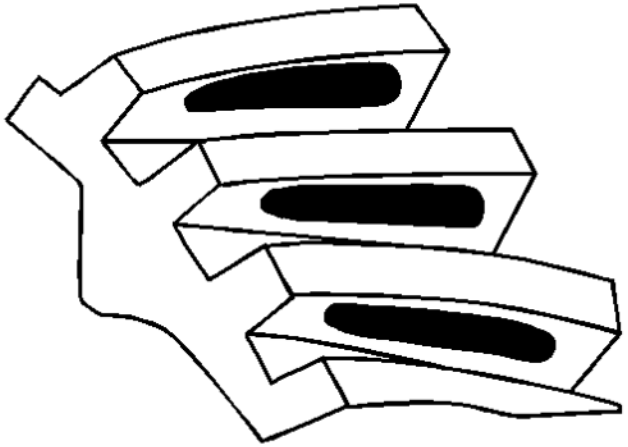
17. Install the bearing cap bolts and tighten to 185 N.m (136 lb ft) for the 10.5 inch axle, or 207 N.m (153 lb ft) for the 11.5 inch axle.
18. Recheck the backlash following the steps above to verify that the backlash is within specifications.
19. Install the differential bearing adjuster nut retainers.
20. Install the differential bearing adjuster nut retainer bolts to tighten to 27 N.m (20 lb ft).
21. Measure the drive pinion and differential case side bearing preload and adjust, if necessary following the steps above.
22. Once the backlash and bearing preload is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to Gear Tooth Contact Pattern Inspection.

GEAR TOOTH CONTACT PATTERN INSPECTION

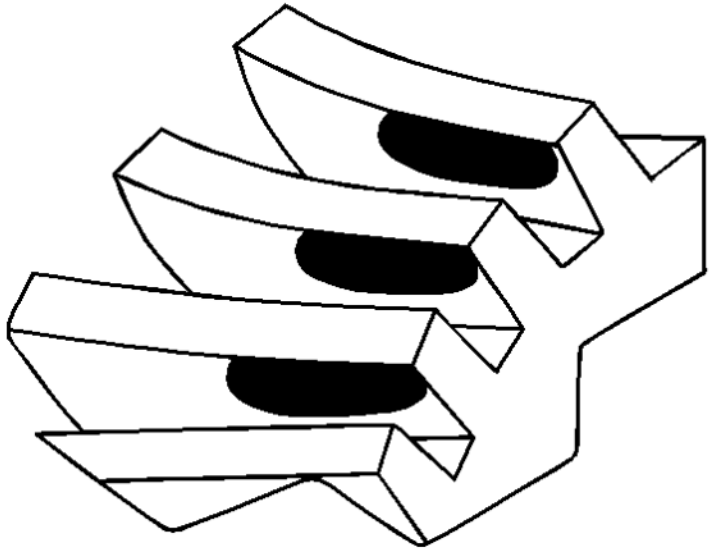
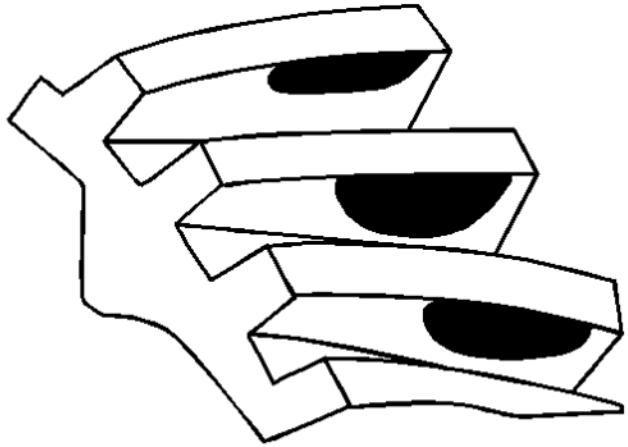
Pattern Evaluation (Ring Gear)

<table>
<tr><th>Drive Side Heel Toe</th><th>Coast Side Toe Heel</th><th>Pattern Condition</th><th>Corrective Action</th></tr>
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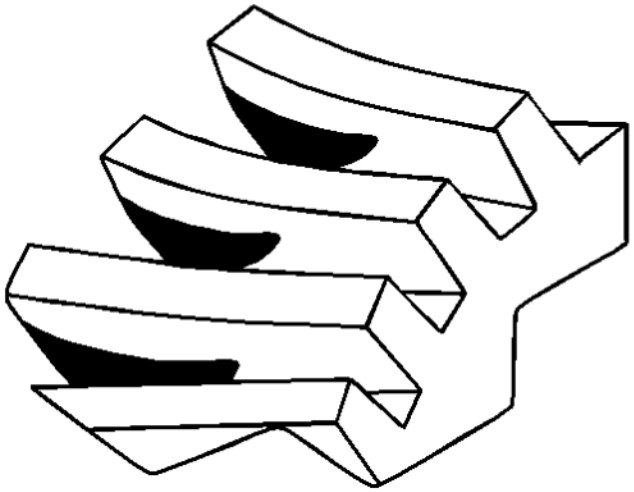
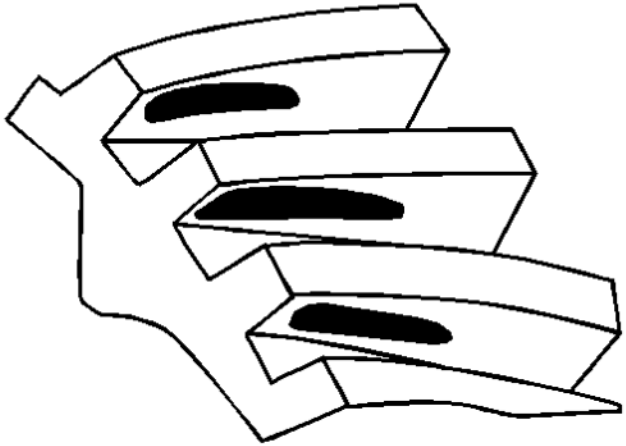
If the pinion depth needs to be adjusted, refer to Pinion Depth Adjustment (8.6 Inch Axle)Pinion Depth Adjustment (10.5 Inch Axle)Pinion Depth Adjustment (9.5 Inch Axle)Pinion Depth Adjustment (9.76 Inch Axle).
If the backlash needs to be adjusted, refer to Backlash Adjustment (9.5/9.76 Inch Axle)Backlash Adjustment (8.6 Inch Axle)Backlash Adjustment (10.5 Inch Axle).
For the ring gear to pinion gear wear pattern test and the proper identification of the 2-Cut and 5-Cut, refer to Differential Drive Pinion Gear and Ring Gear Description and Operation.

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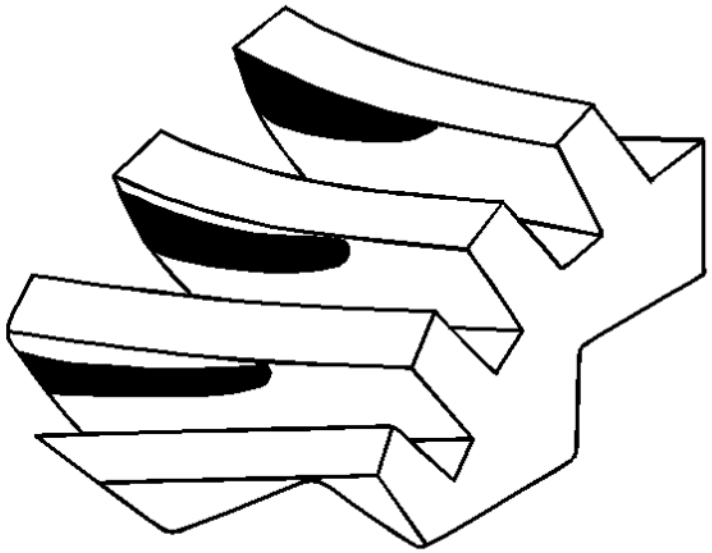
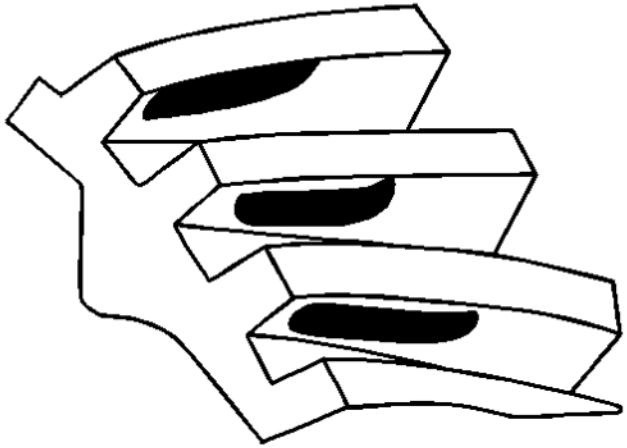
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Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
Drive Pinion Issue - 2-Cut Gearset			
		Drive Side Low Heel Contact - Coast Side High Heel Contact	1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion closer to the ring gear by increasing the thickness of the pinion shim on a one-piece axle housing or by decreasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.

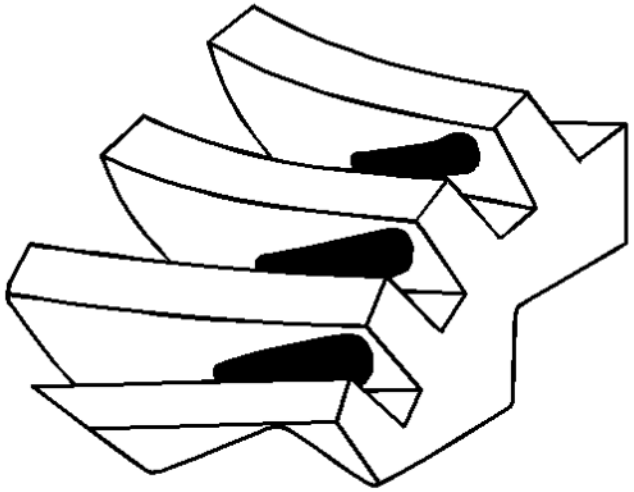
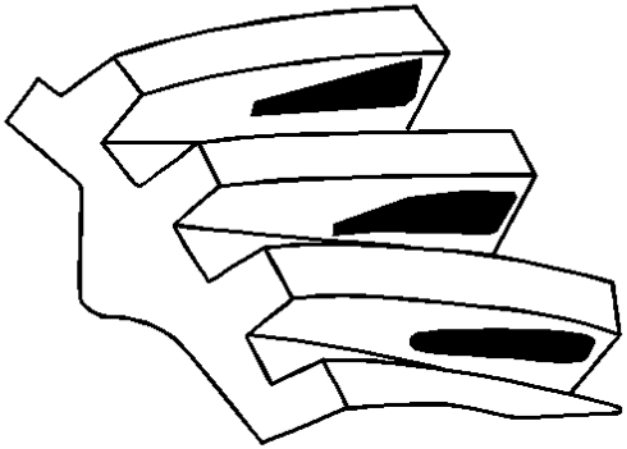
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Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Low Heel Contact - Coast Side Low Toe Contact	1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion away from the ring gear by decreasing the thickness of the pinion shim on a one-piece axle housing or by increasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.
Backlash Issue			

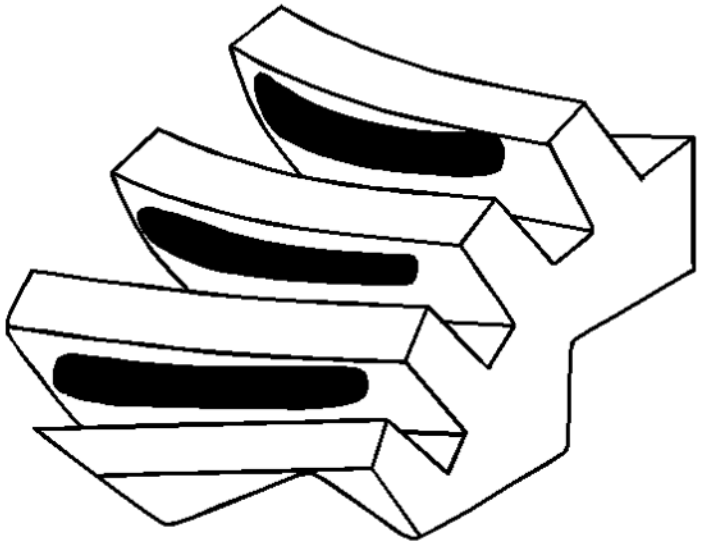
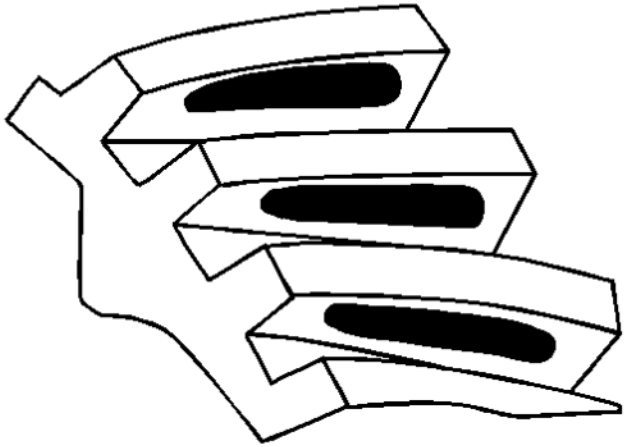
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Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side High Heel Contact - Coast Side High Toe Contact	Backlash incorrect. The ring gear is too far away from the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).

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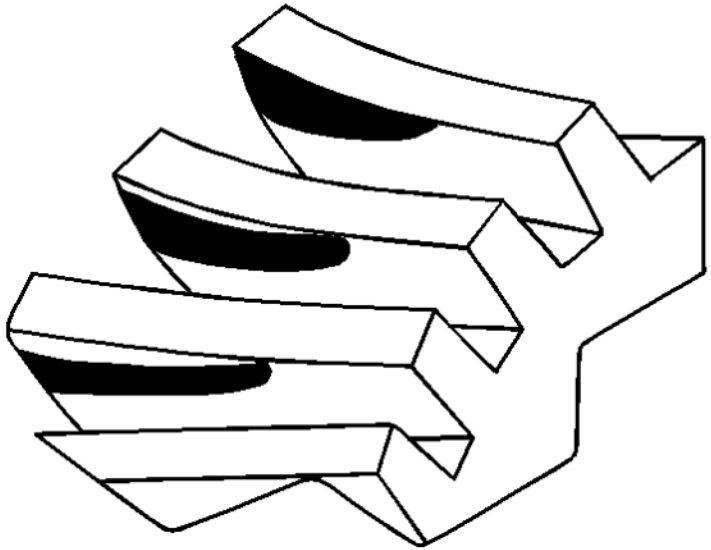
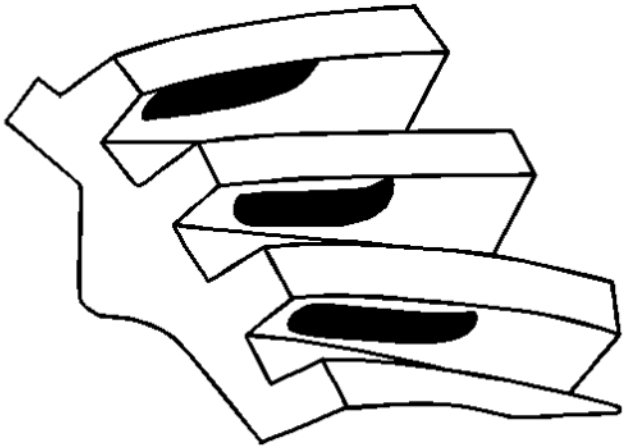
Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Low Toe Contact - Coast Side Low Heel Contact	Backlash incorrect. The ring gear is too close to the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).

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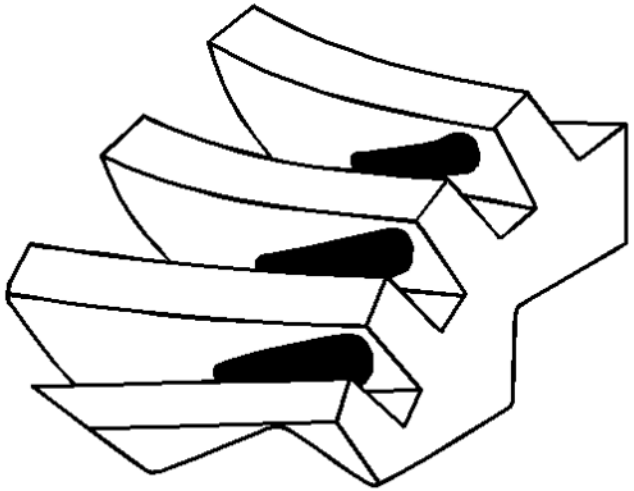
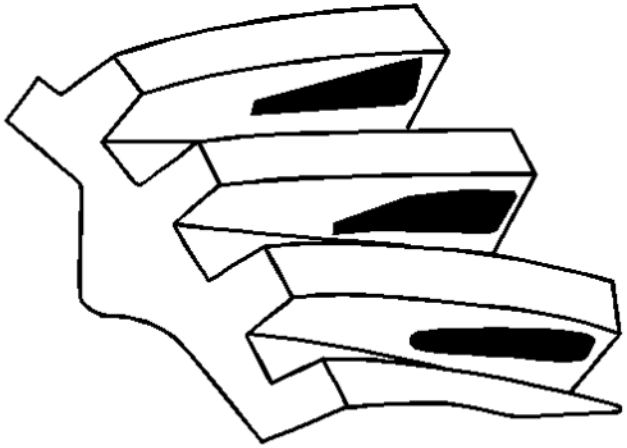
Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Centered - Coast Side Centered	No correction required.
Drive Pinion Issue - 5-Cut Gearset			

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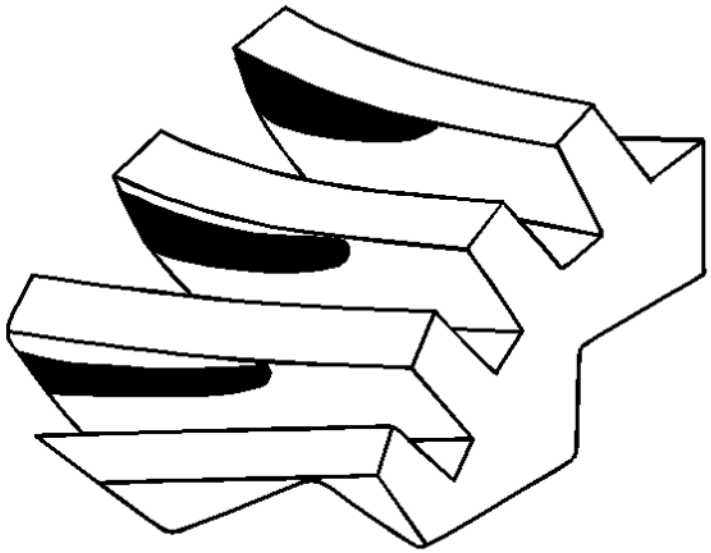
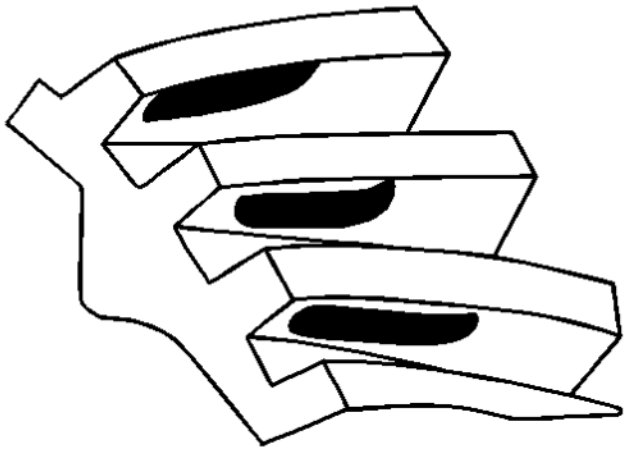
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Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side High and Slightly Heel Contact - Coast Side High and Slightly Toe Contact	1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion closer to the ring gear by increasing the thickness of the pinion shim on a one-piece axle housing or by decreasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.

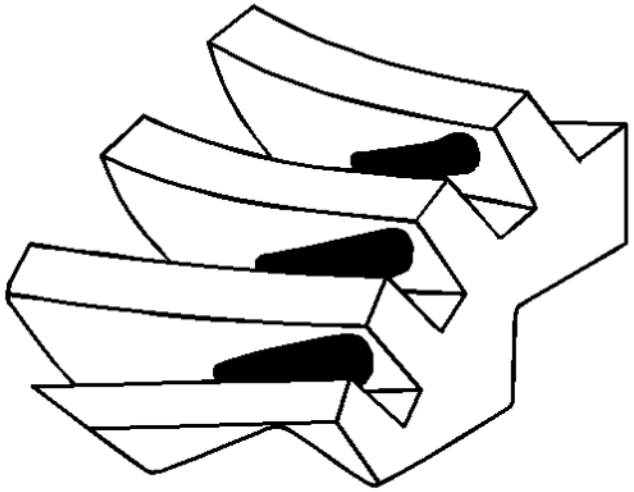
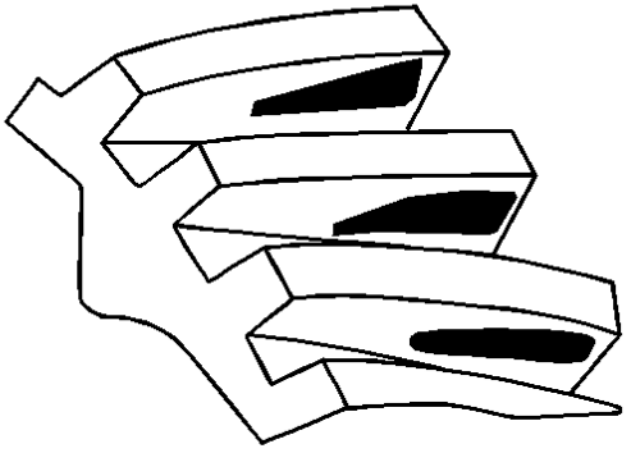
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Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Low and Slightly Heel Contact - Coast Side High and Slightly Toe Contact	1. Inspect the backlash to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in) 2. If backlash is correct, move the drive pinion away from the ring gear by decreasing the thickness of the pinion shim on a one-piece axle housing or by increasing the thickness of the pinion shim on the 10.5 inch two-piece axle housing.
Backlash Issue			

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Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Heel Contact - Coast Side Toe Contact	Backlash incorrect. The ring gear is too far away from the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).

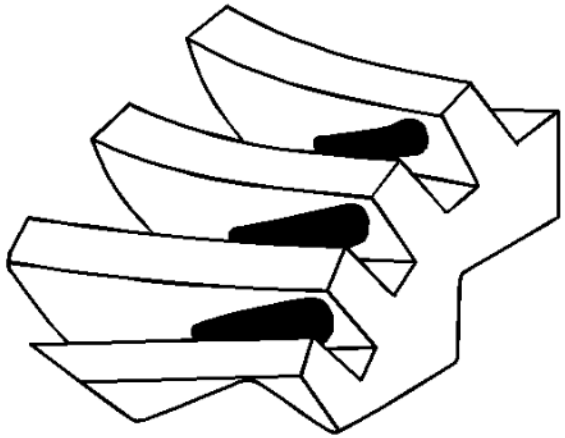
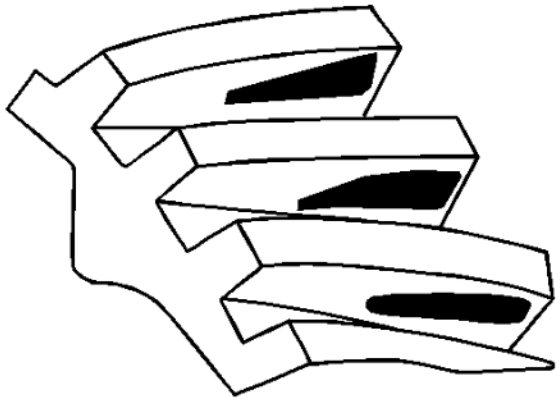
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Drive Side Heel Toe	Coast Side Toe Heel	Pattern Condition	Corrective Action
		Drive Side Toe Contact - Coast Side Heel Contact	Backlash incorrect. The ring gear is too close to the drive pinion. Inspect and adjust the backlash as necessary to ensure that it is approximately 0.08-0.13 mm (0.003-0.005 in).

Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
Face Hobbing				

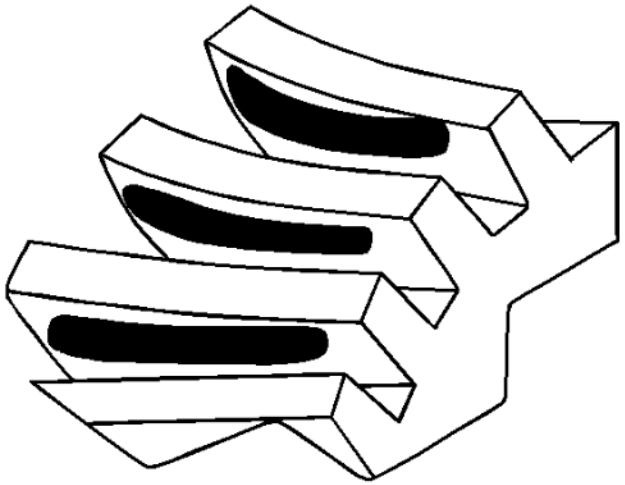
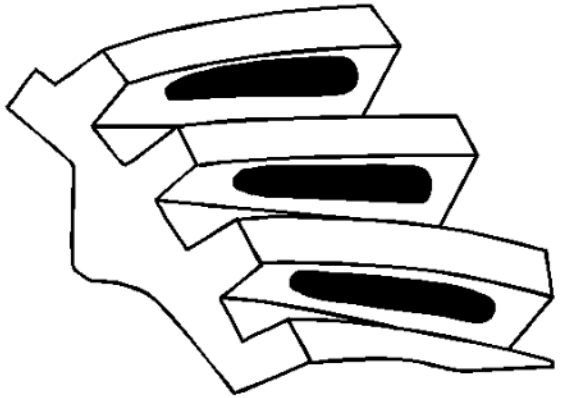
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Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Toe Contact		Heel Contact	Pinion shim correct. Increase backlash.

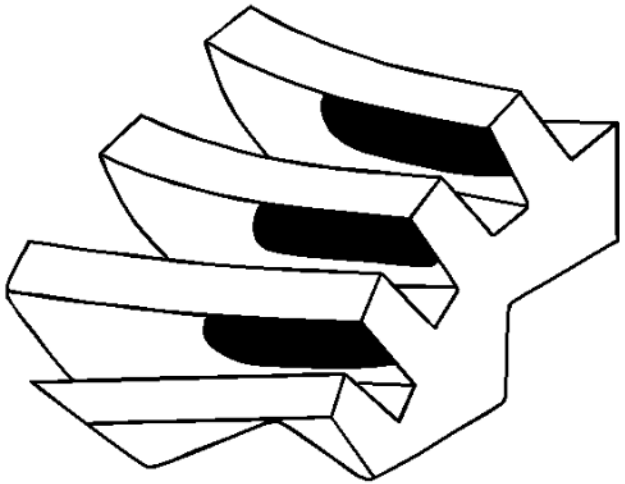
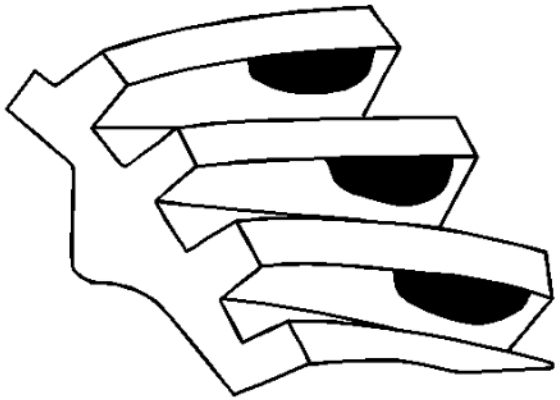
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Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Desirable Pattern - Drive pattern should be centered on tooth		Desirable Pattern - Coast pattern should be center to slightly toe on tooth	No correction required.

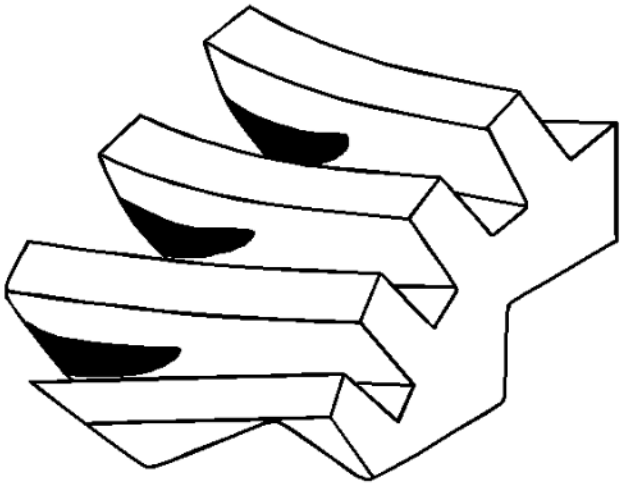
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Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Top Toe Contact		Top Heel Contact	Backlash correct. Increase in pinion shim.

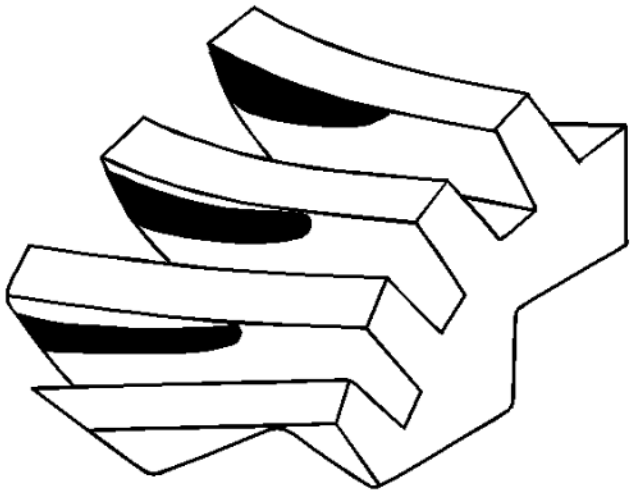
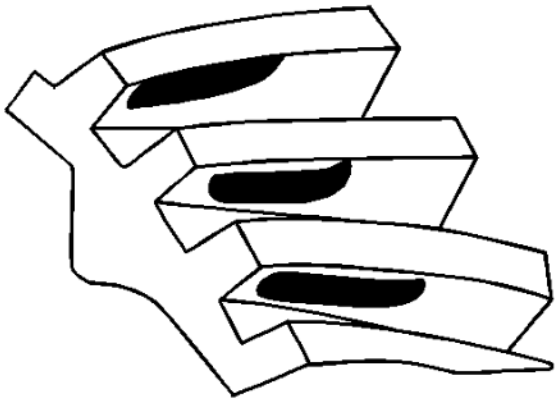
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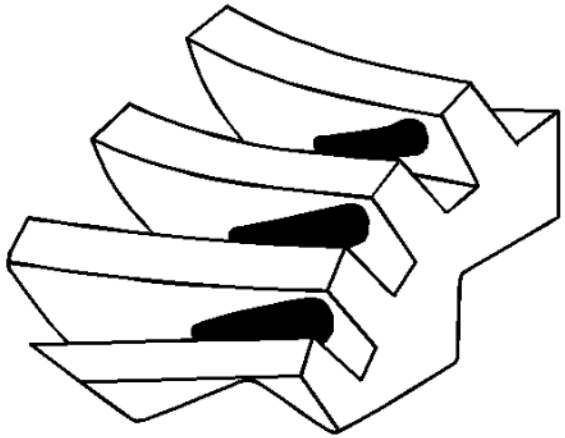
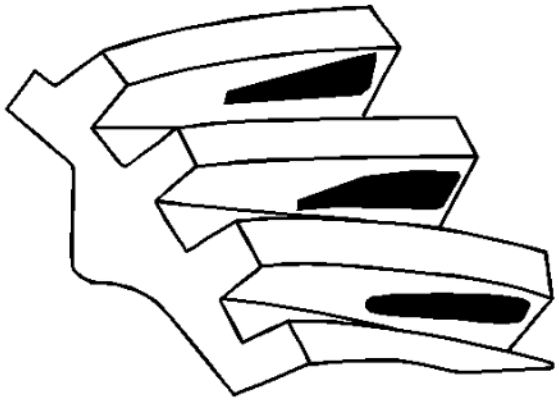
Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Root Heel Contact		Root Toe Contact	Backlash correct. Decrease in pinion shim.

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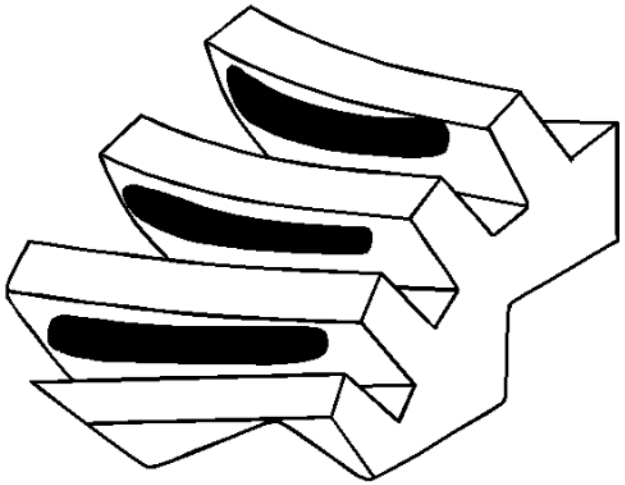
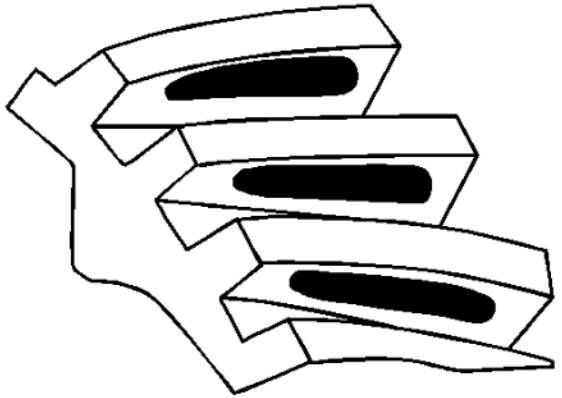
Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Top Heel Contact		Top Toe Contact	Pinion shim correct. Decrease backlash.

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Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Root Toe Contact		Root Heel Contact	Pinion shim correct. Increase backlash.
Face Milling				

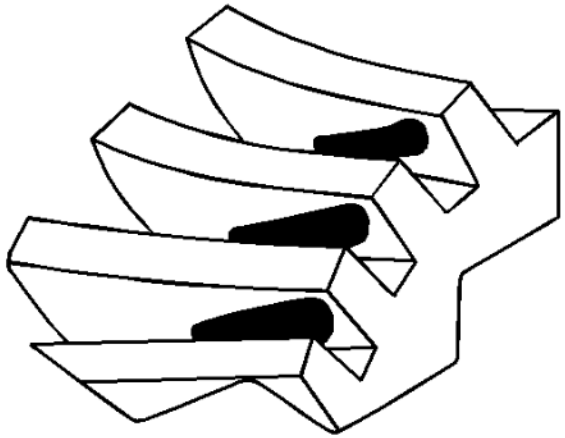
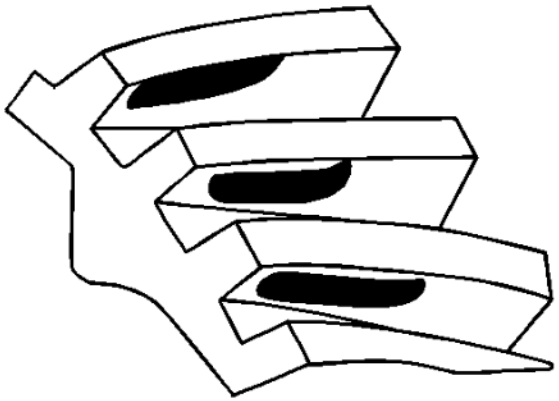
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Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Desirable Pattern - Drive pattern should be centered on tooth		Desirable Pattern - Coast pattern should be center to slightly toe on tooth	No correction required.

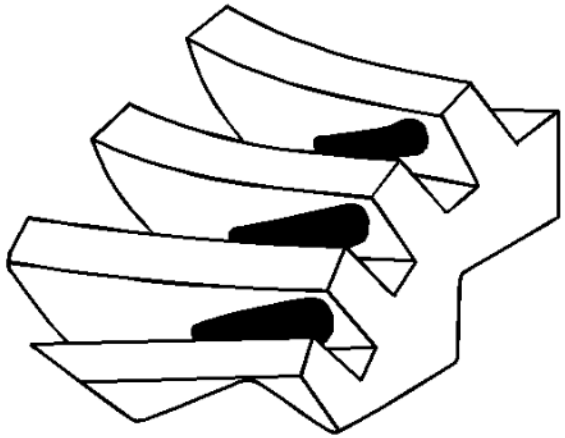
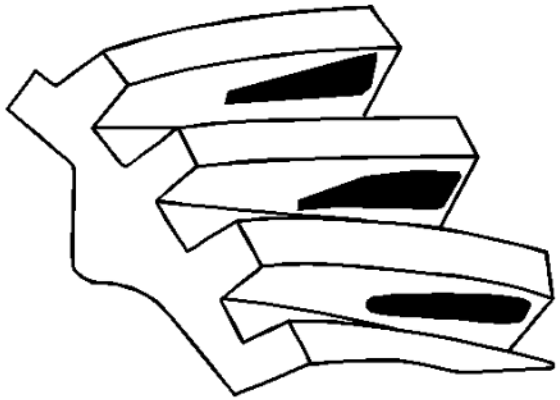
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Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Top and Slightly Heel Contact		Top and Slightly Toe Contact	Backlash correct. Increase in pinion shim.

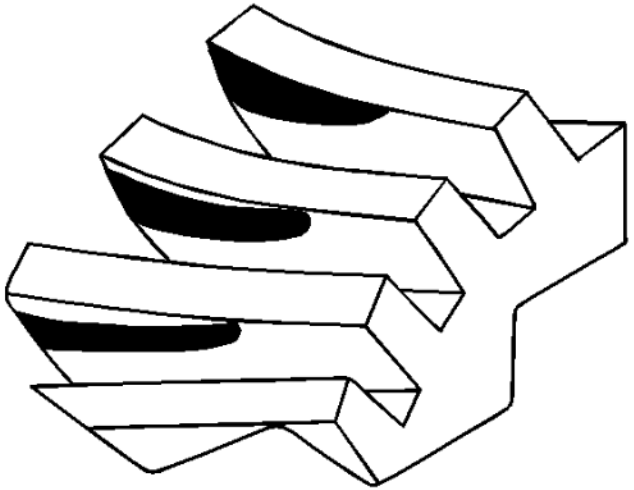
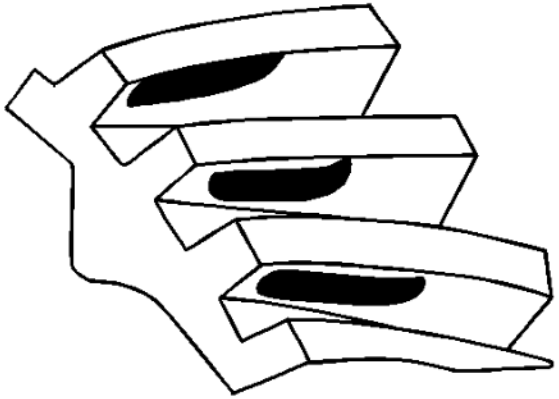
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Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Root and Slightly Toe Contact		Root and Slightly Heel Contact	Backlash correct. Decrease in pinion shim.

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Drive Side Heel Toe	Pattern Condition	Coast Side Toe Heel	Pattern Condition	Corrective Action
	Heel Contact		Toe Contact	Pinion shim correct. Decrease backlash.

LOCKING DIFFERENTIAL DISASSEMBLE (8.6/9.5/9.76 INCH AXLES)

Special Tools

J-26252 Bushing Remover

1. Remove the ring gear if needed. Refer to **Differential Drive Pinion Gear Bearing Replacement (8.6/9.5/9.76 Inch Axles)**.

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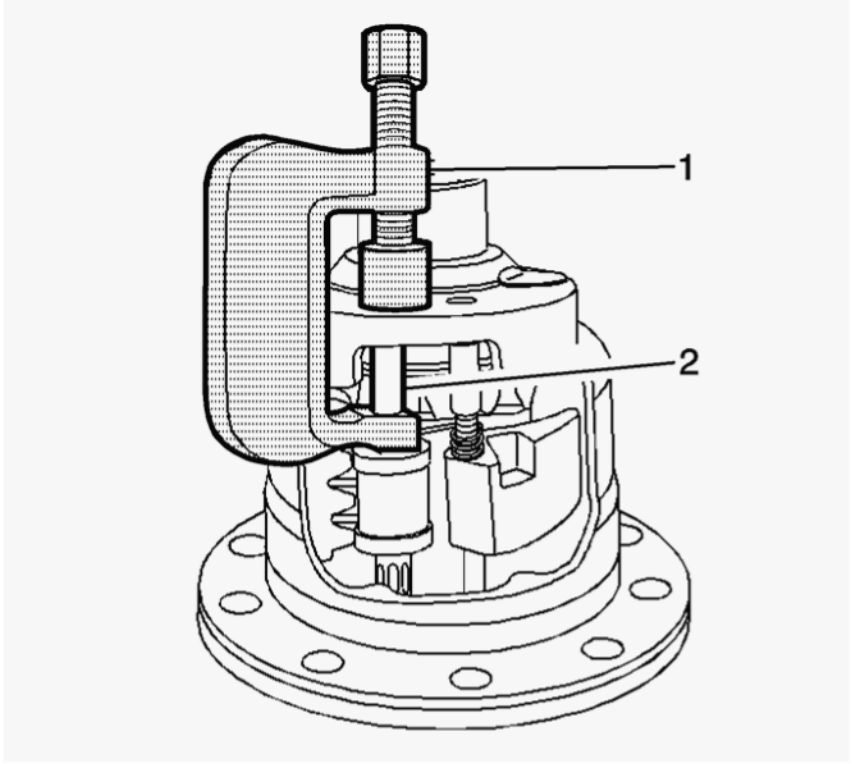


Fig. 260: Governor Bushing And Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Rotate the side gears in order to position the governor assembly between the two side gears before removing.**

2. Using the **J-26252** remover (1), remove the governor bushing (2).

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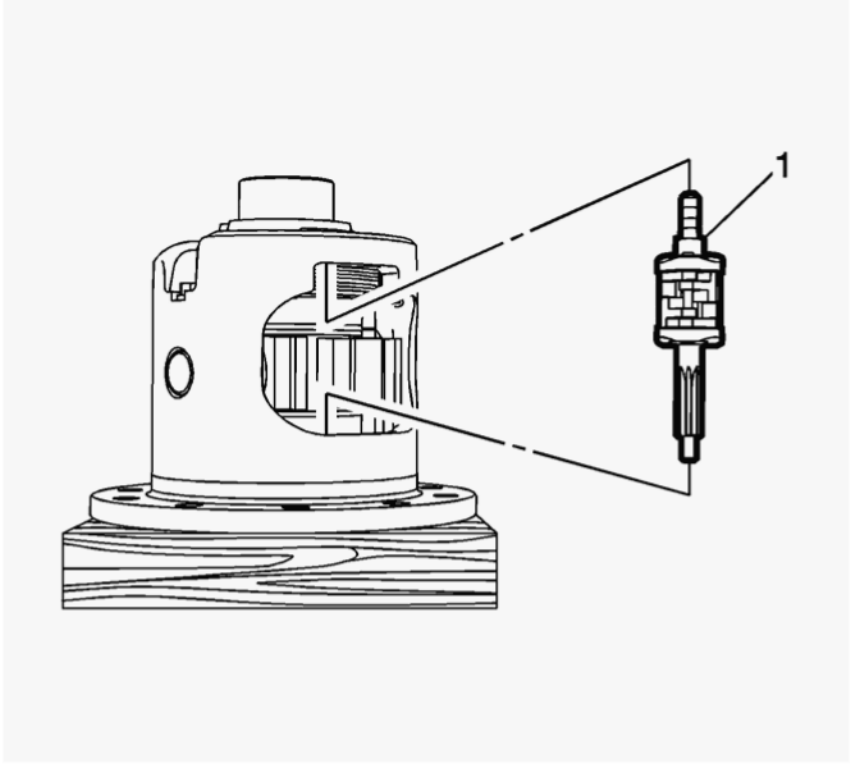


Fig. 261: Locking Differential Governor
Courtesy of GENERAL MOTORS COMPANY

3. Remove the locking differential governor (1).

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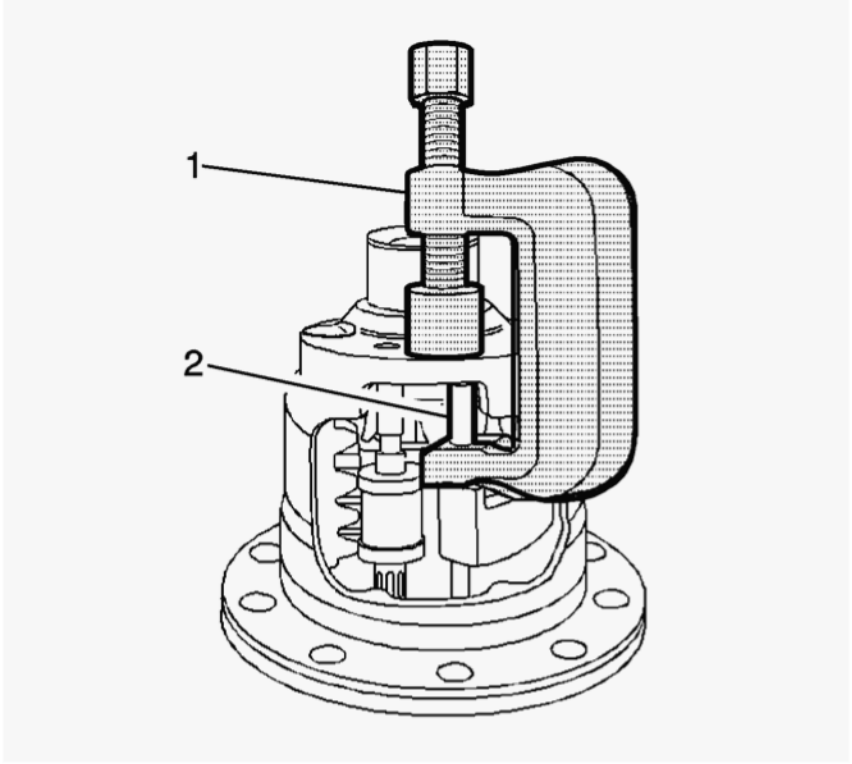


Fig. 262: Latching Bracket Assembly Bushing And Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Rotate the side gears in order to position the locking differential latching bracket between the two side gears before removing.**

4. Using the **J-26252** remover (1), remove the latching bracket bushing (2).

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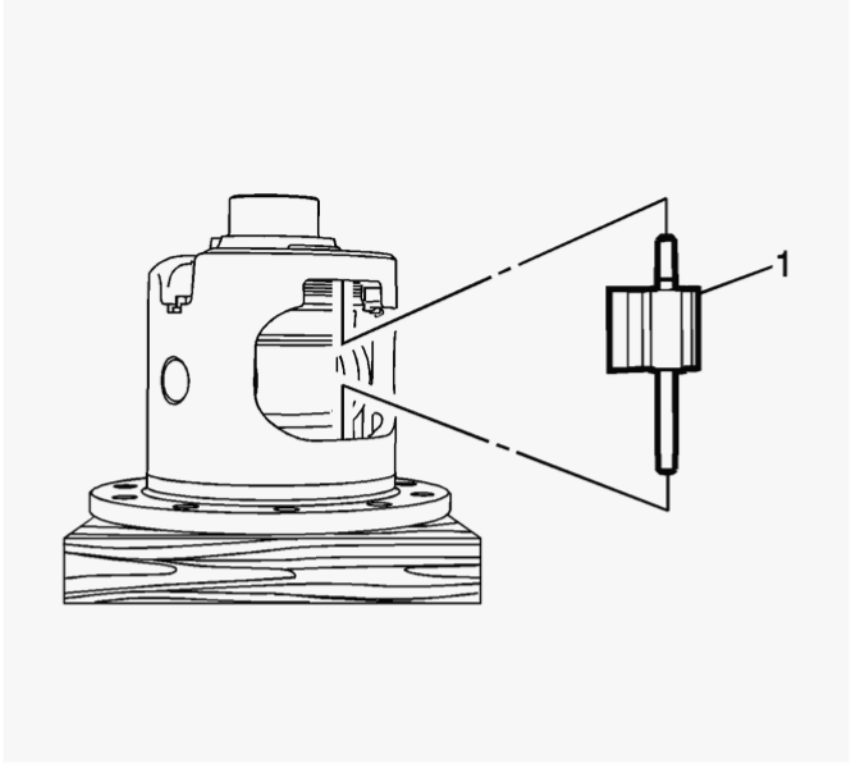


Fig. 263: Locking Differential Latching Bracket
Courtesy of GENERAL MOTORS COMPANY

5. Remove the locking differential latching bracket (1).

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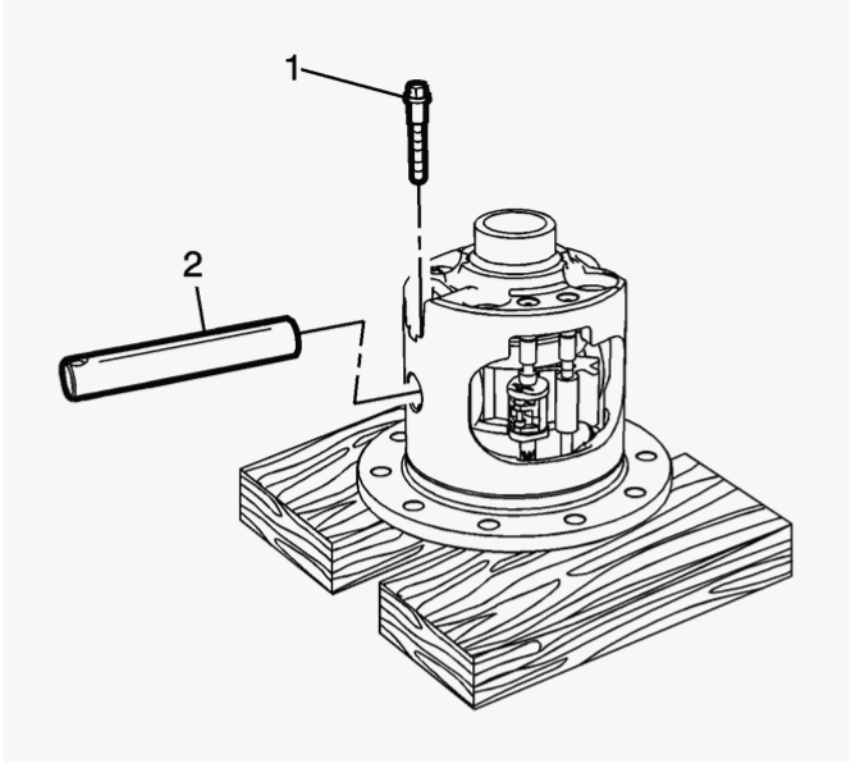


Fig. 264: Differential Pinion Gear Shaft And Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Remove the pinion differential pinion gear shaft bolt (1).
7. Remove the differential pinion gear shaft (2).

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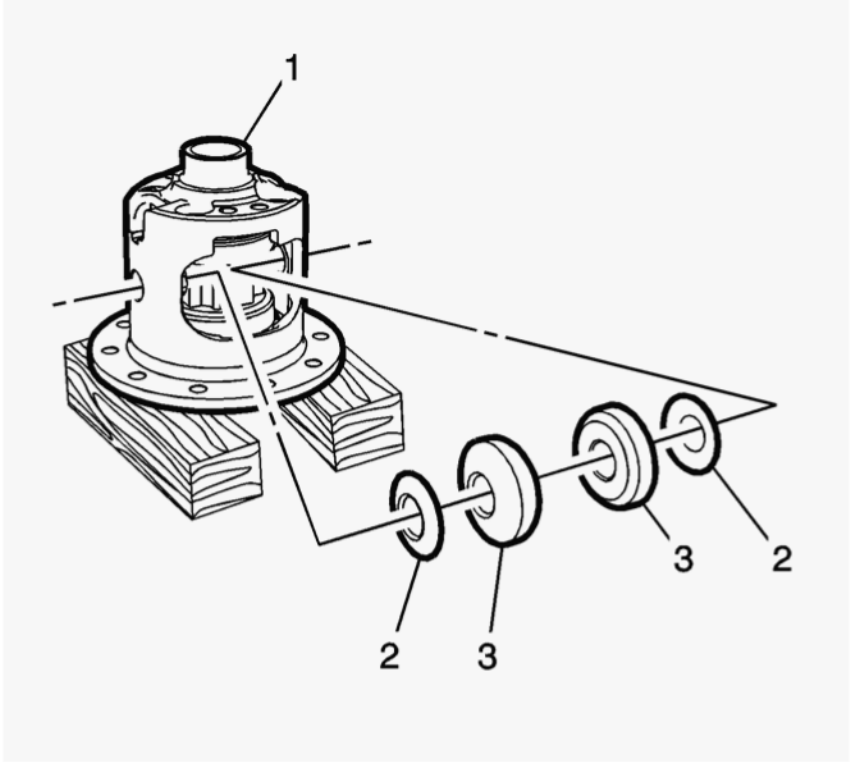


Fig. 265: Differential Side Gears And Thrust Washers
Courtesy of GENERAL MOTORS COMPANY

8. Rotate the differential side gears to remove the differential gears (3) and thrust washers (2).

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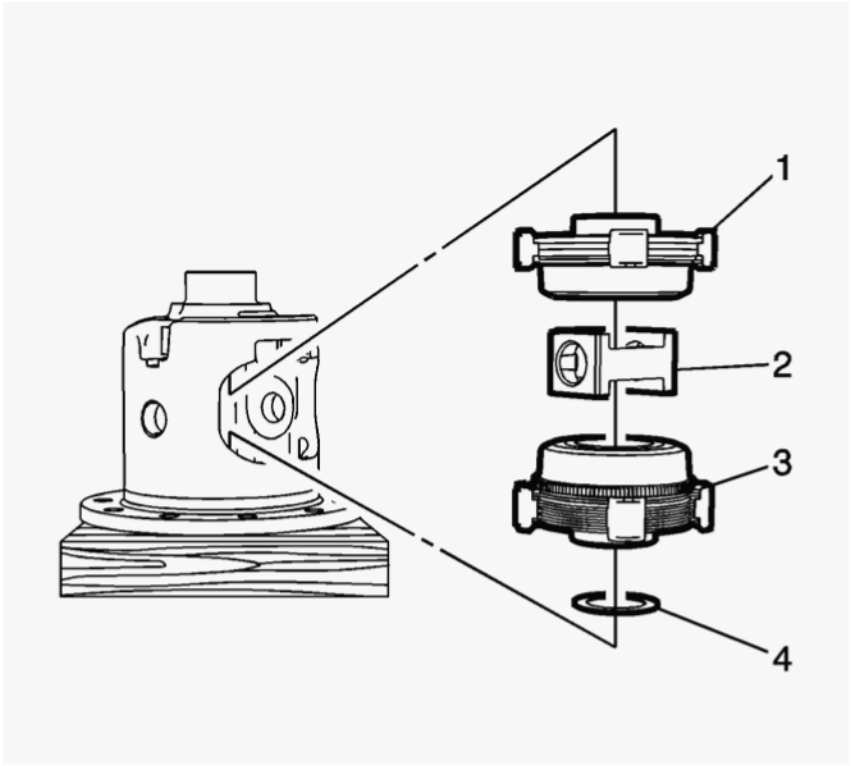


Fig. 266: Right Clutch Pack And Thrust Block
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- **The left differential clutch pack is next to the ring gear. The right differential clutch pack is opposite the ring gear.**
- **Hold the right clutch pack while removing the thrust block.**

9. Remove the locking differential thrust block (2).
10. Remove the right locking differential clutch disc pack and side gear (1).
11. Remove the left locking differential clutch disc and side gear (3).
12. Remove the washer (4).

LOCKING DIFFERENTIAL DISASSEMBLE (10.5 INCH AXLE)

1. Remove the differential case assembly. Refer to **Differential Replacement (10.5 Inch Axle)**.
2. Remove the differential ring gear. Refer to **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
3. Remove the differential side bearings. Refer to **Differential Bearing Replacement**.

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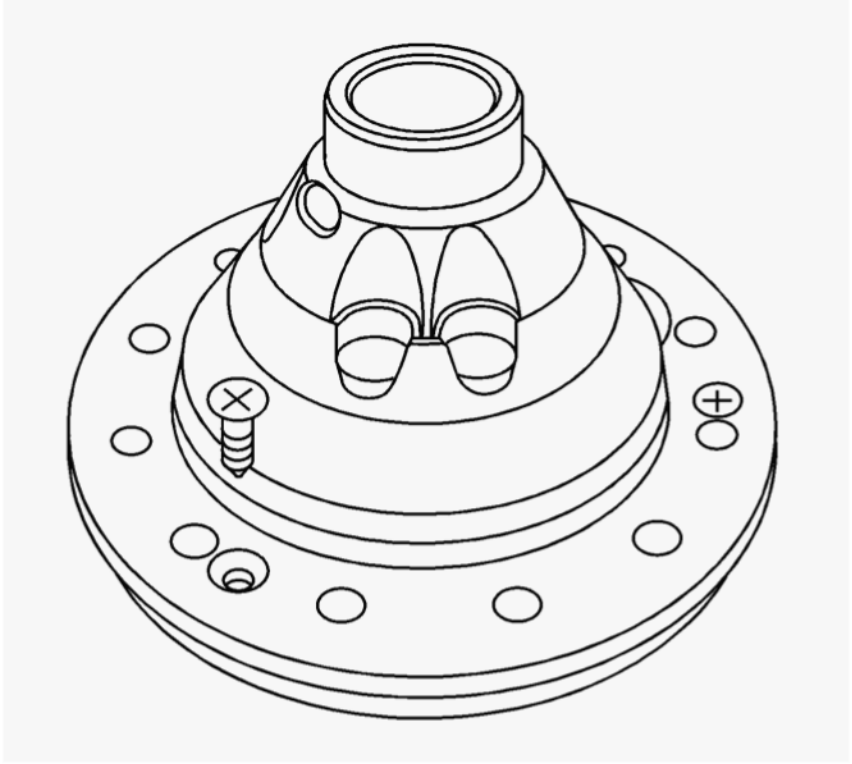


Fig. 267: Removing Differential Case Screws
Courtesy of GENERAL MOTORS COMPANY

4. Remove the differential case screws.

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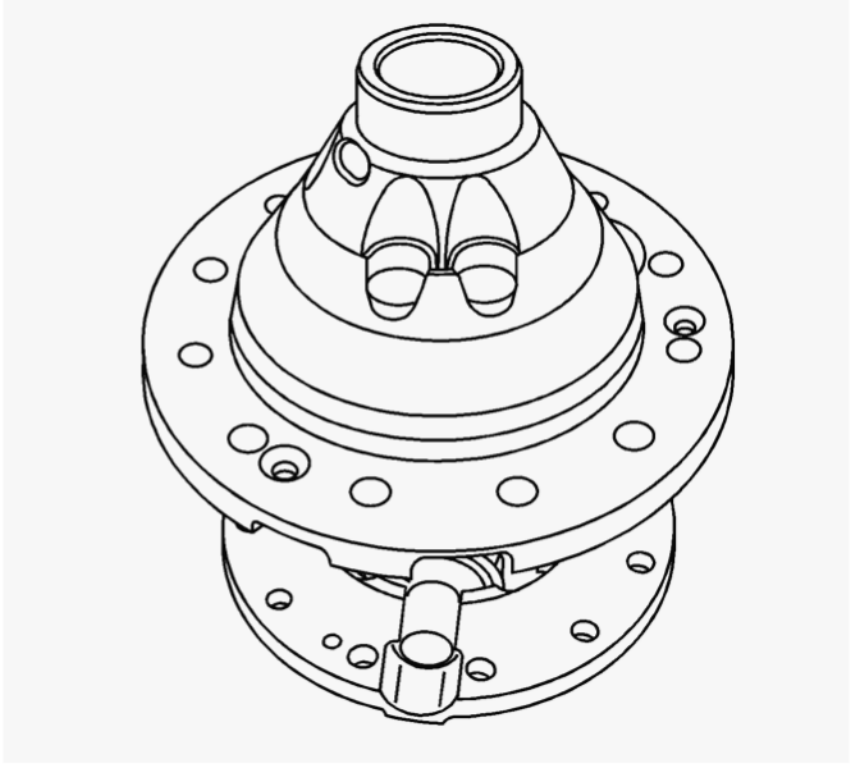


Fig. 268: Separating Case Halves
Courtesy of GENERAL MOTORS COMPANY

5. Use the yoke hole location to pry and separate the differential case halves.
6. Hold the locking differential cam, side gear, and the clutch plate assembly in the right side case half.

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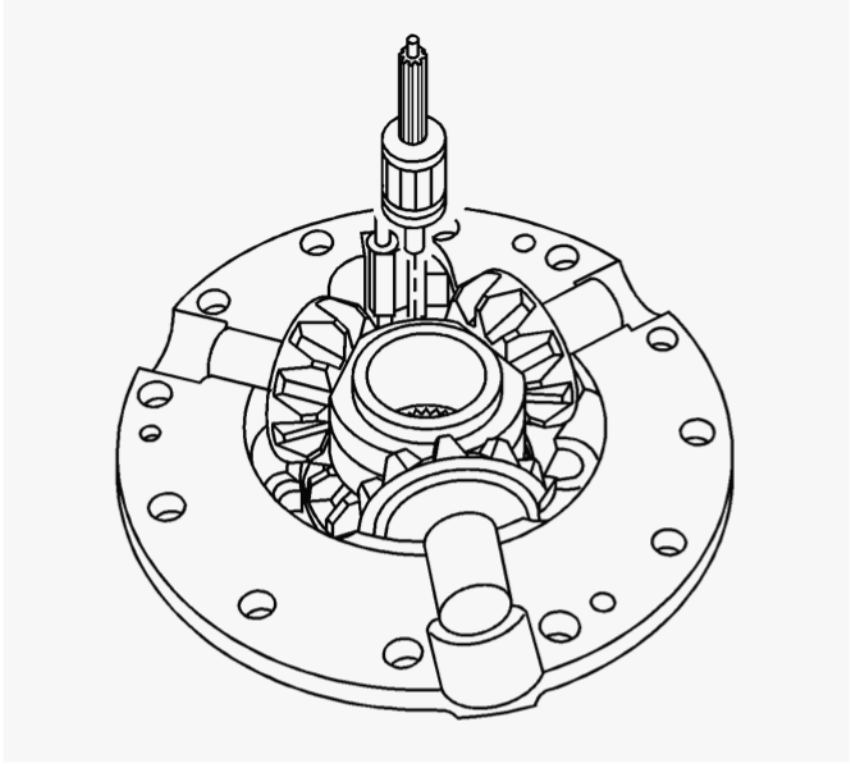


Fig. 269: Governor Assembly
Courtesy of GENERAL MOTORS COMPANY

7. Remove the differential governor.

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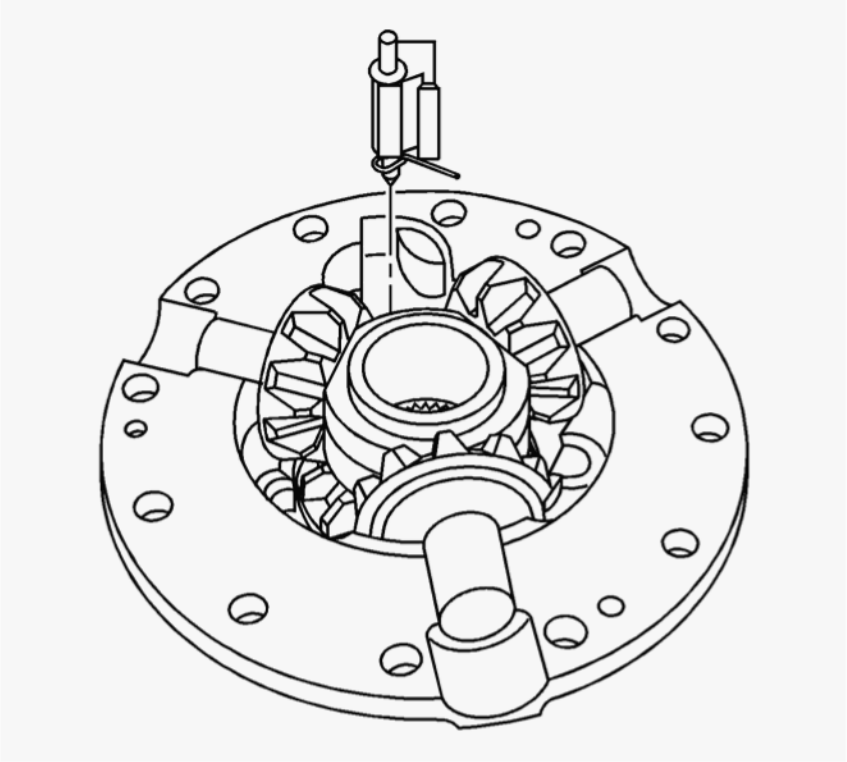


Fig. 270: Differential Governor Lock
Courtesy of GENERAL MOTORS COMPANY

8. Remove the differential governor lock.

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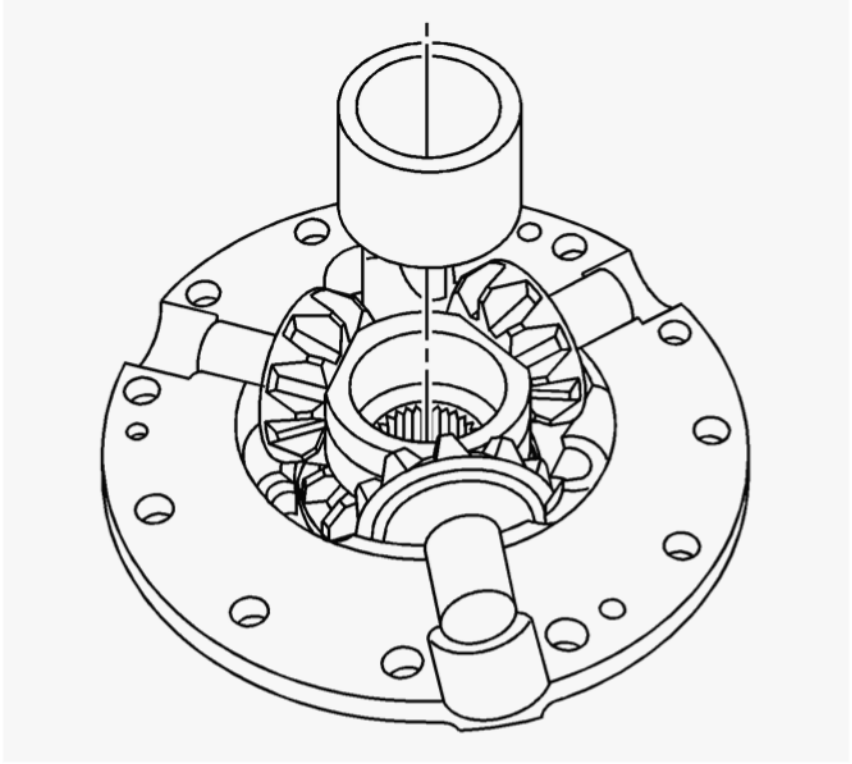


Fig. 271: Thrust Block
Courtesy of GENERAL MOTORS COMPANY

9. Remove the locking differential thrust block.

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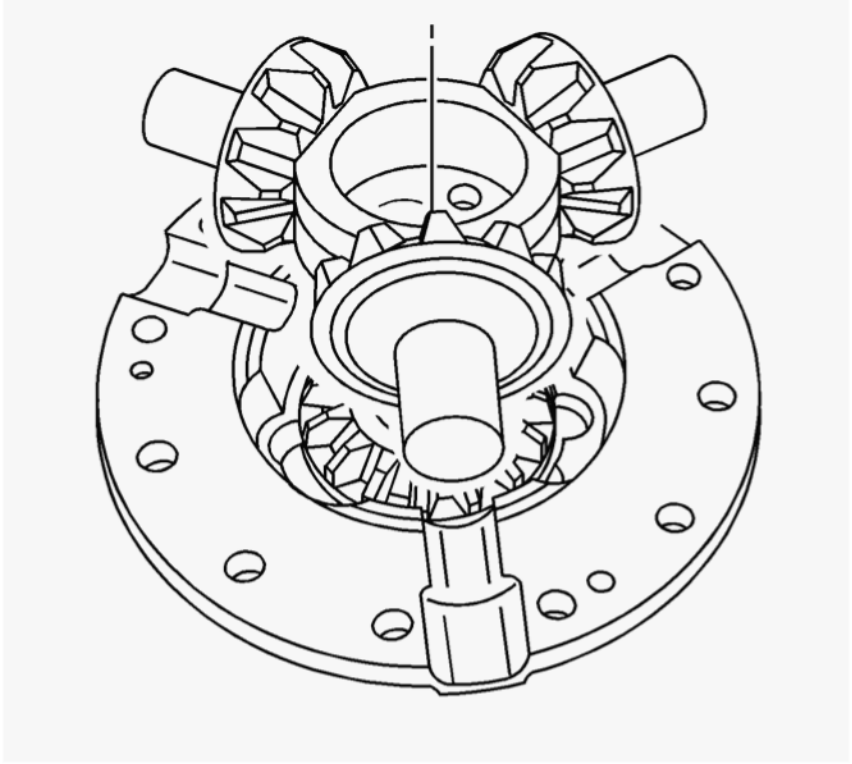


Fig. 272: Removing Differential Case Components
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Mark the differential spider, the differential pinion gears and the differential pinion gears accordingly in order to re-assemble the components correctly into the differential case.**

10. Remove the locking differential spider, pinion gears and the thrust washers.

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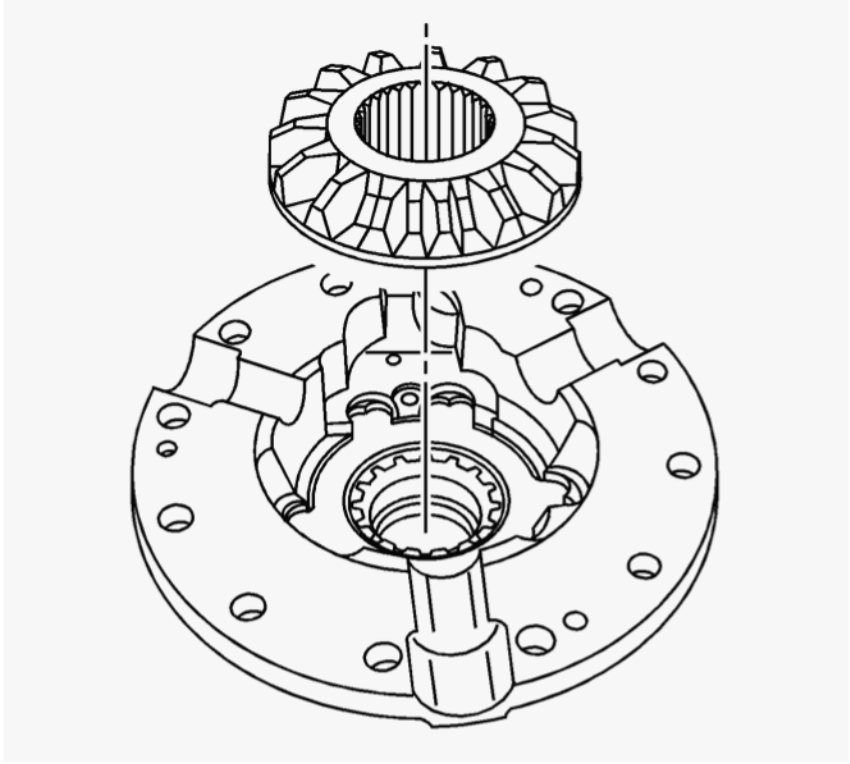


Fig. 273: Removing Locking Differential Side Gear
Courtesy of GENERAL MOTORS COMPANY

11. Remove the locking differential side gear.

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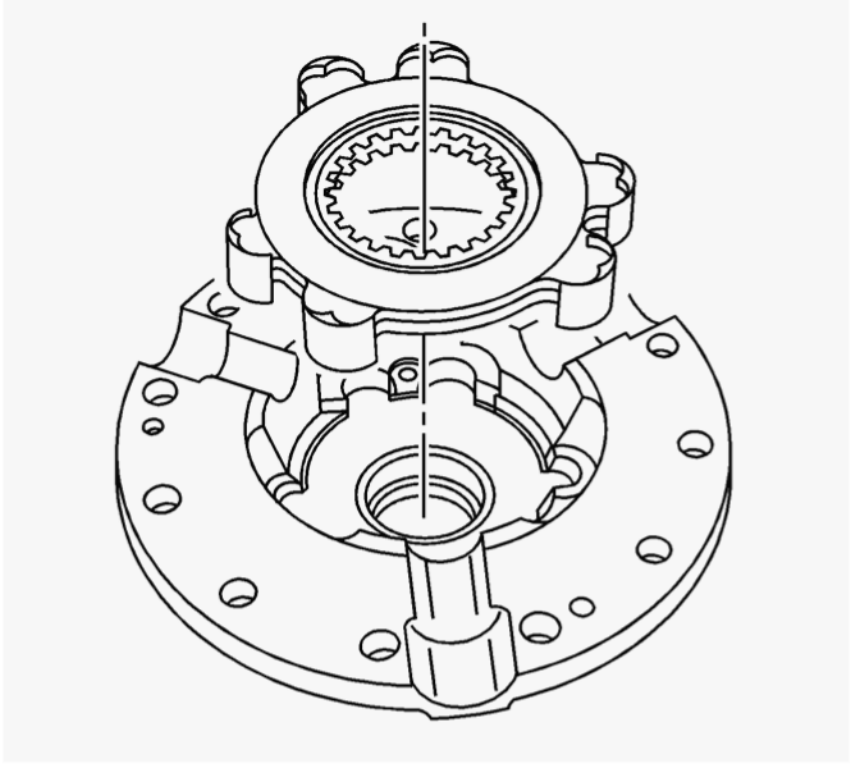


Fig. 274: Left Side Clutch Plates And Guide Clips
Courtesy of GENERAL MOTORS COMPANY

12. Remove the left side clutch plates and the guide clips.

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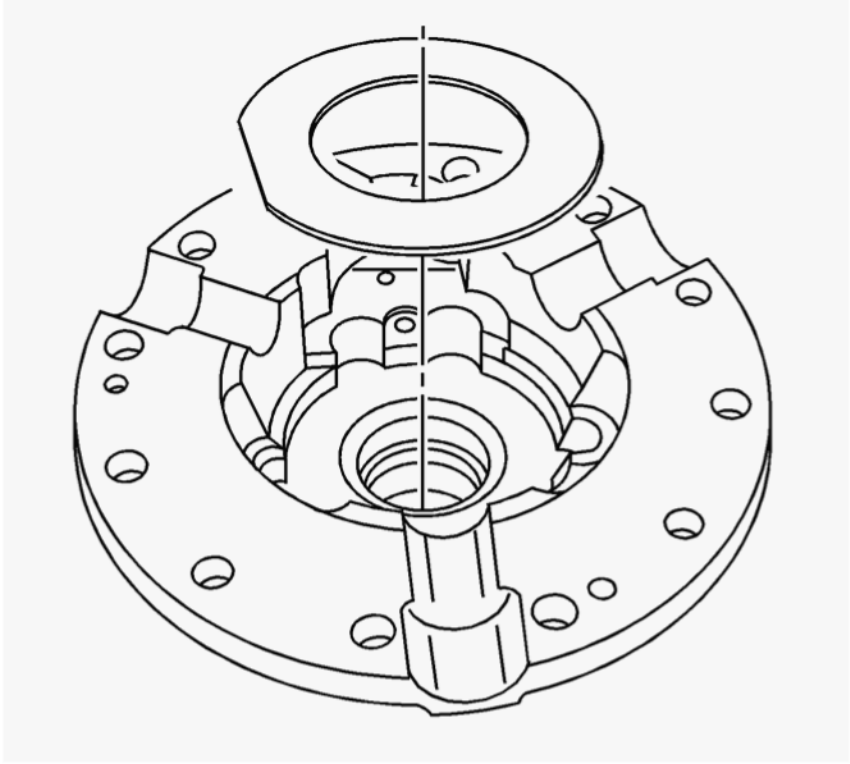


Fig. 275: Removing Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

13. Remove the left side gear thrust washer.

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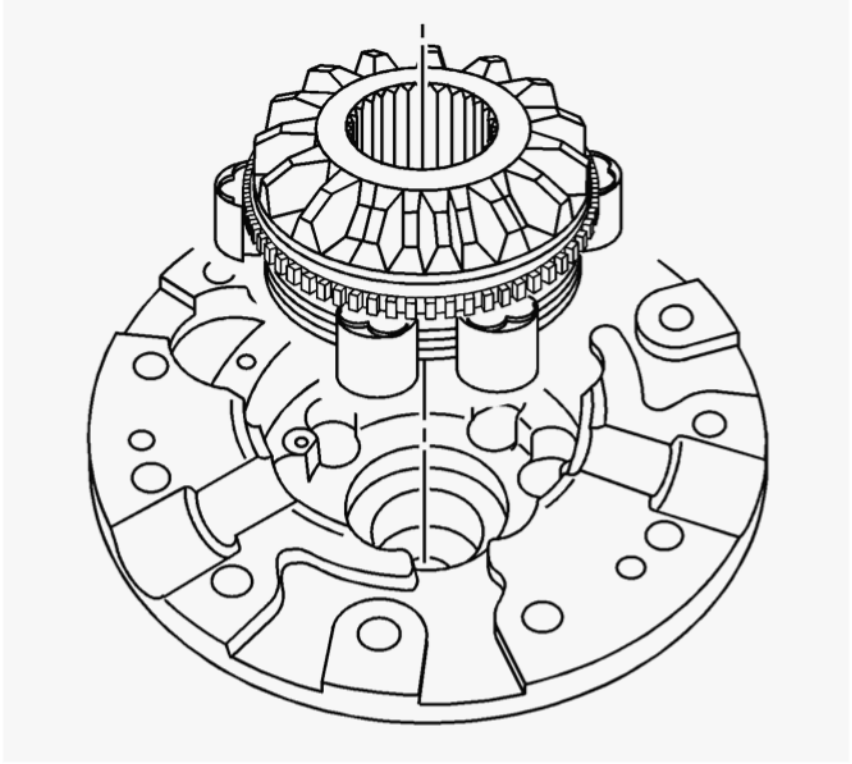


Fig. 276: Right Side Cam Unit And Clutch Plate Assembly
Courtesy of GENERAL MOTORS COMPANY

14. Remove the right side cam unit and clutch plate assembly.

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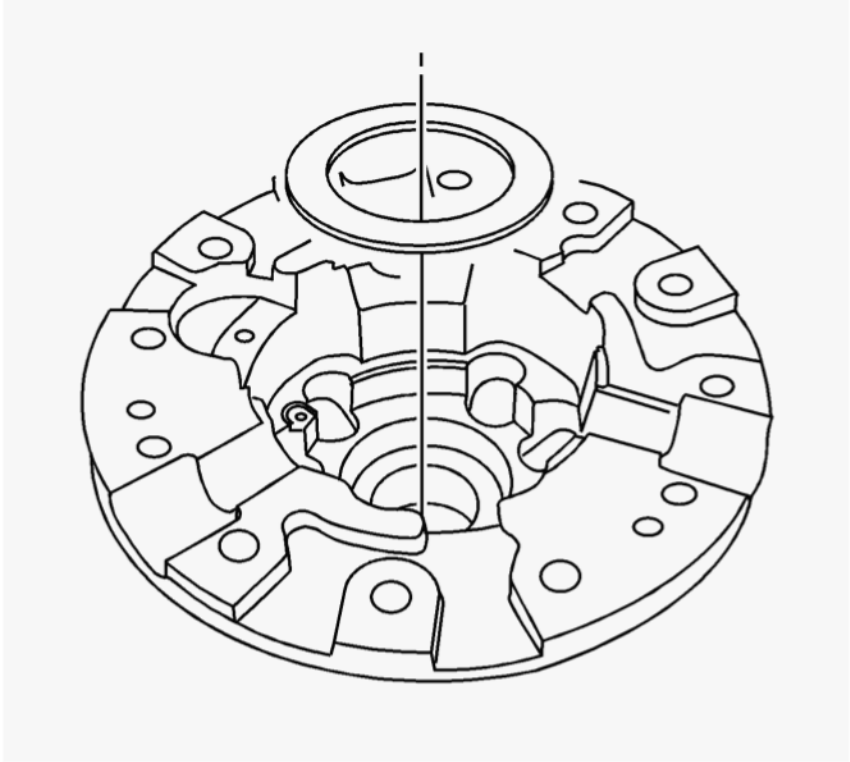


Fig. 277: Removing Right Side Locking Differential Clutch Disc Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

15. Remove the right side locking differential clutch disc thrust washer.
16. Disassemble the left side differential side gear and clutch disc assembly. Refer to **Locking Differential Clutch Disc Assembly Disassemble (10.5 Inch Axle)**.
17. Disassemble the right side locking differential side gear cam unit and clutch disc assembly. Refer to **Locking Differential Cam Unit Disassemble (10.5 Inch Axle)**.

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY DISASSEMBLE (9.5/9.76 INCH AXLE)

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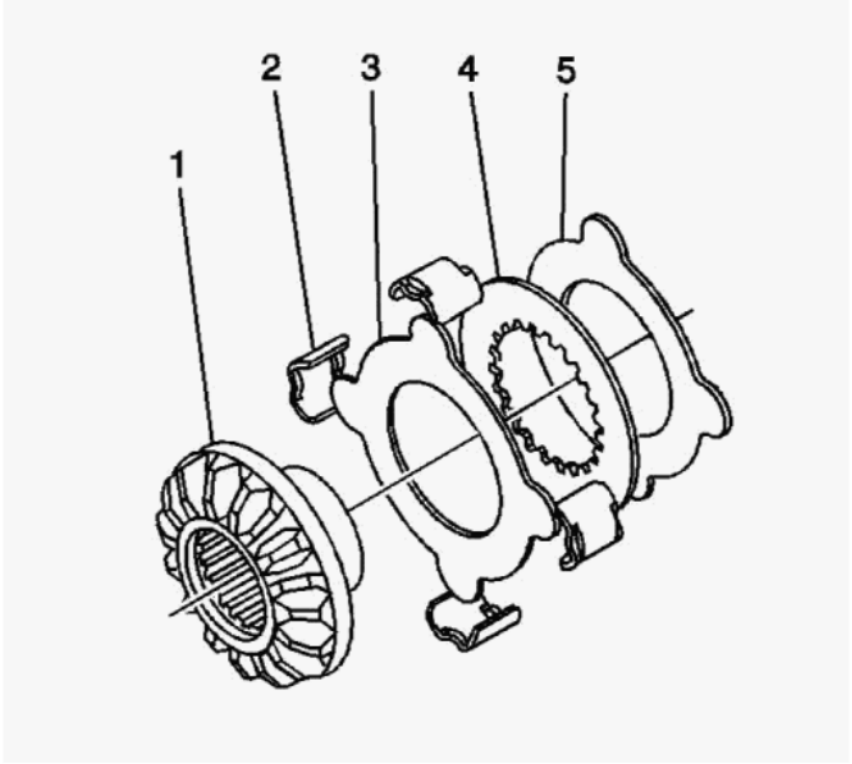


Fig. 278: Guide Clips, Clutch Discs And Splined Discs
Courtesy of GENERAL MOTORS COMPANY

1. Remove the guide clips (2).
2. Remove the clutch discs and the splined discs (3-5) from the locking differential side gear (1).

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY DISASSEMBLE (10.5 INCH AXLE)

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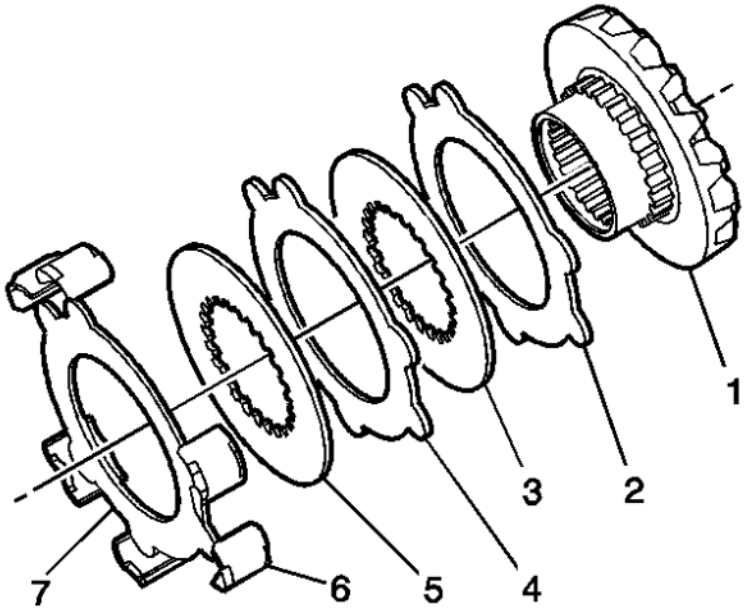


Fig. 279: Removing Locking Differential Clutch Disc Assembly (10.5 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

1. Remove the guide clips (6).
2. Remove the clutch discs and the splined discs (2-5, 7) from the locking differential side gear (1).

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY DISASSEMBLE (8.6 INCH AXLE)

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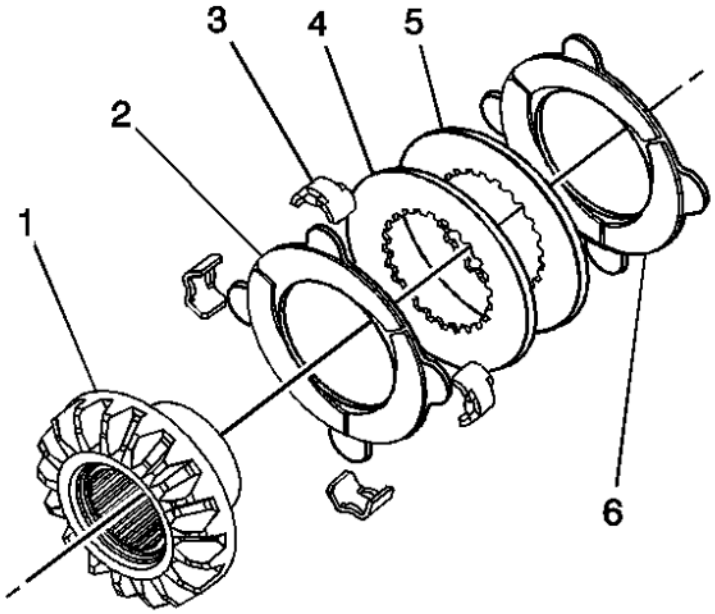


Fig. 280: Removing Locking Differential Clutch Disc Assembly (8.6 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

1. Remove the guide clips (3).
2. Remove the clutch discs and the splined discs (2, 4-6) from the locking differential side gear (1).

LOCKING DIFFERENTIAL CAM UNIT DISASSEMBLE (8.6 INCH AXLE)

1. Remove the locking differential clutch disc thrust washer.

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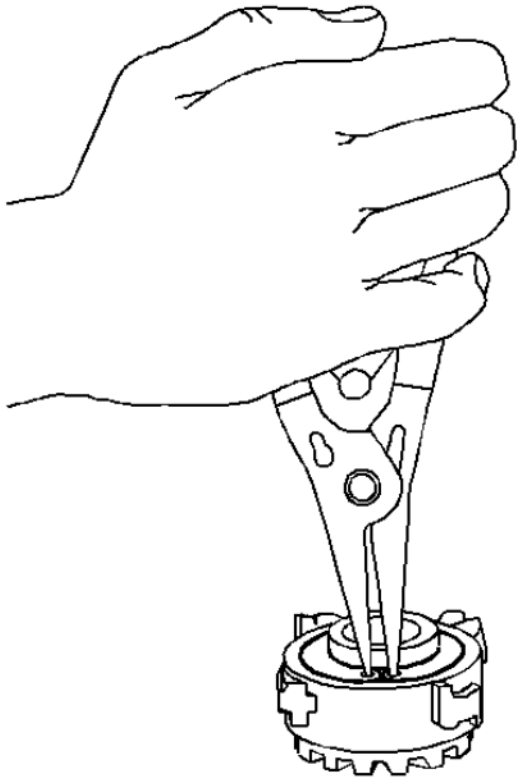


Fig. 281: Removing Locking Differential Retaining Ring (8.6 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

2. Using the appropriate tool, remove the external snap ring retainer.

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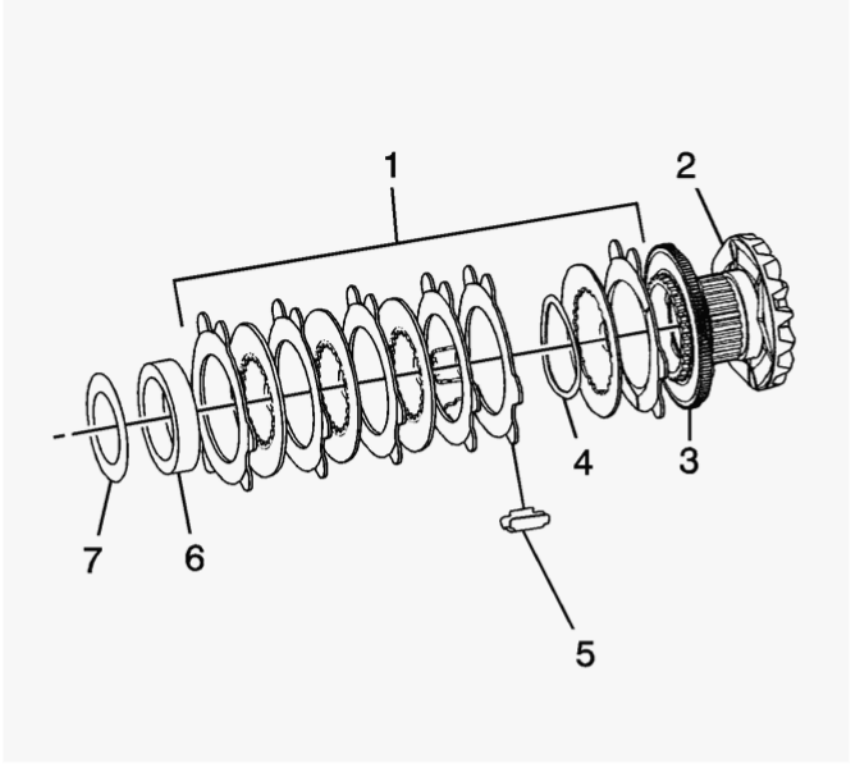


Fig. 282: Disassembled View Of Locking Differential Clutch Disc Set
Courtesy of GENERAL MOTORS COMPANY

3. Remove and disassemble the locking differential clutch disc set (1).

NOTE: **The locking differential clutch disc thrust washer is NOT serviced separately. It is serviced with the locking differential clutch disc set.**

4. Remove the locking differential clutch disc thrust washer (4).

NOTE: **The locking differential clutch disc guide is NOT serviced separately. It is serviced with the locking differential clutch disc set.**

5. Remove the locking differential clutch disc guide (5).
6. Remove the locking differential cam (3).

LOCKING DIFFERENTIAL CAM UNIT DISASSEMBLE (9.5/9.76 INCH AXLE)

Special Tools

- **J-22912-01** Split Plate Bearing Puller
- **J-45232** Adjuster Bearing Replacer (Left Side)

1. Measure and record the overall length of the locking differential side gear assembly from the front of the locking differential side locking differential side gear to thrust washer.
2. Remove the guide clips.

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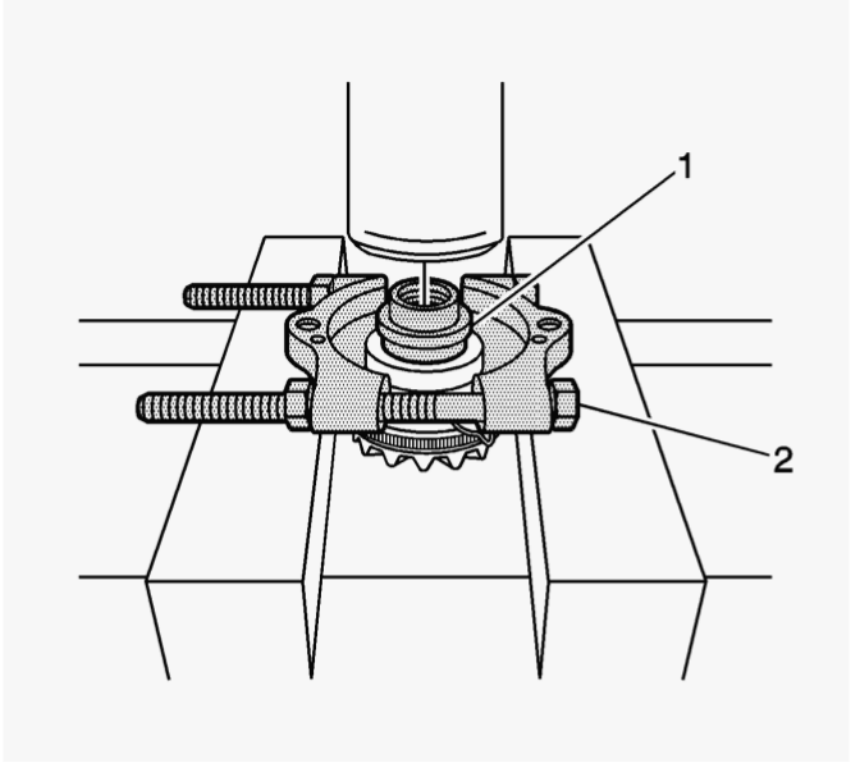


Fig. 283: Removing Thrust Sleeve
Courtesy of GENERAL MOTORS COMPANY

3. Using the **J-22912-01** puller (2), **J-45232** replacer (1) and a hydraulic press, remove the locking differential side gear thrust sleeve.

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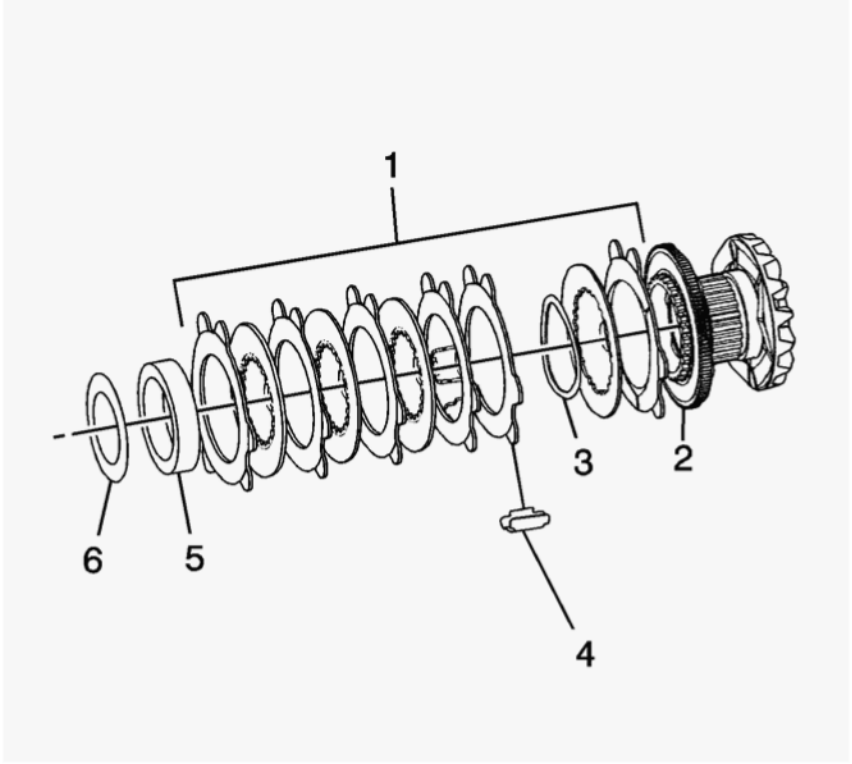


Fig. 284: Disassembled View Of Locking Differential Side Gear Components
Courtesy of GENERAL MOTORS COMPANY

4. Remove the locking differential clutch disc thrust washer (6).
5. Remove the locking differential side gear thrust sleeve (5).
6. Remove the locking differential clutch disc set (1).

NOTE: **The locking differential clutch disc guide is NOT serviced separately. It is serviced with the locking differential clutch disc assembly.**

7. Remove the locking differential clutch disc guide.
8. Disassemble the locking differential clutch disc assembly (1).

LOCKING DIFFERENTIAL CAM UNIT DISASSEMBLE (10.5 INCH AXLE)

Special Tools

- **J 22912-01** Split Plate Bearing Puller
- **J 45232** Adjuster Bearing Replacer (Left Side)

1. Measure and record the overall length of the locking differential cam, side gear and clutch plate assembly from the front of the gear to the back of the thrust sleeve, including the locking differential clutch disc thrust washer.
2. Remove the guide clips.

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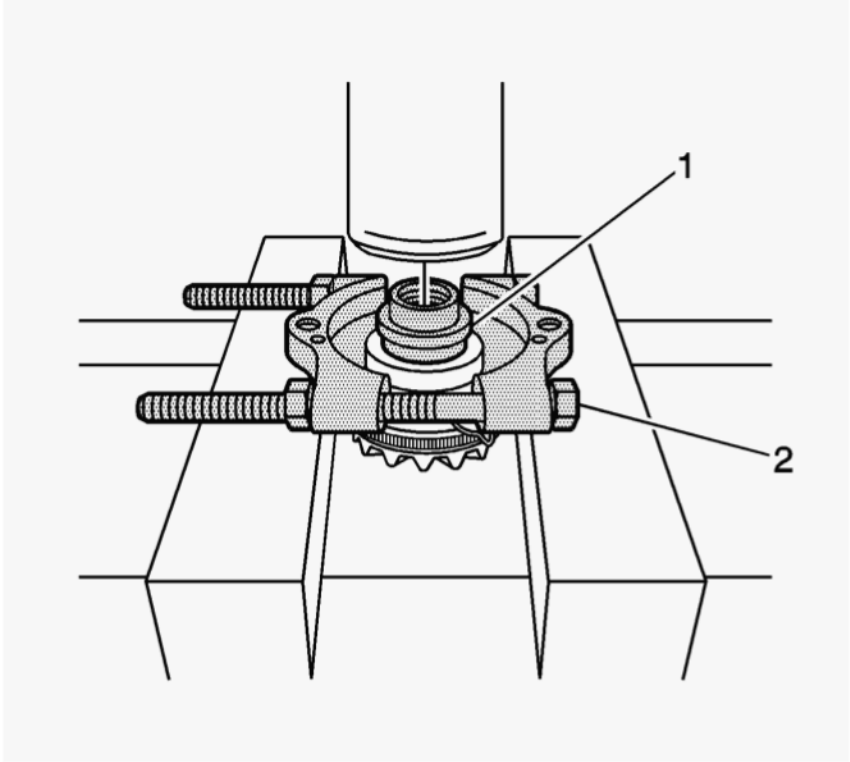


Fig. 285: Removing Thrust Sleeve
Courtesy of GENERAL MOTORS COMPANY

3. Using a hydraulic press, the **J 22912-01** puller (2) and the **J 45232** replacer (1), remove the thrust sleeve.

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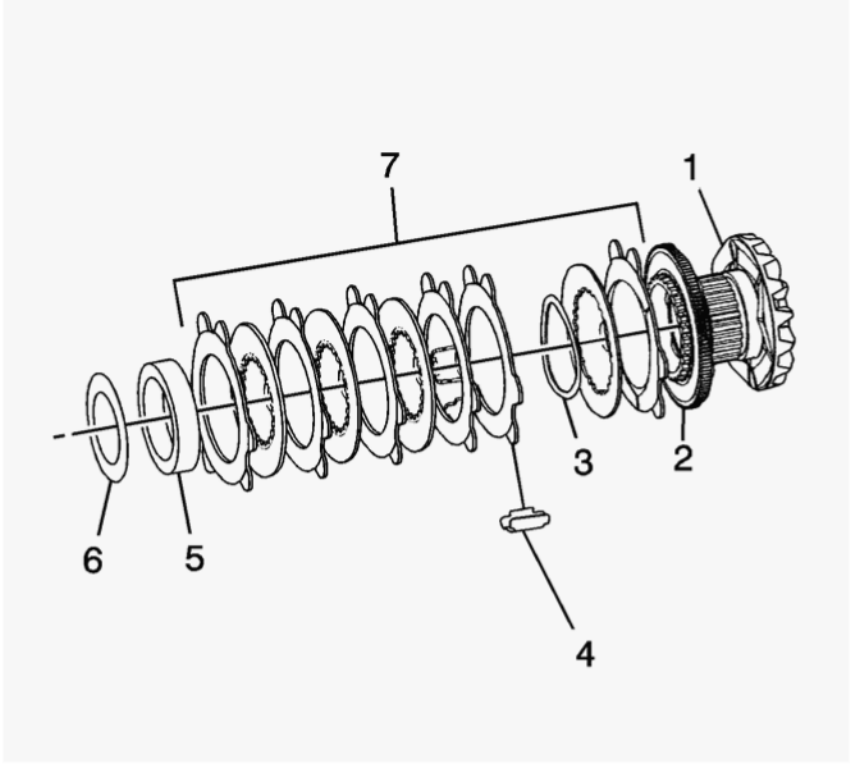


Fig. 286: Disassembled View Of Locking Differential Cam & Locking Differential Side Gear
Courtesy of GENERAL MOTORS COMPANY

4. Remove the differential side gear shim (6).
5. Remove the locking differential side gear thrust sleeve (5).
6. Remove and disassemble the locking differential clutch disc set (7).

NOTE: **The locking differential clutch disc thrust washer is not serviced separately. It is serviced with the locking differential clutch disc set.**

7. Remove the locking differential clutch disc thrust washer (3).

NOTE: **The locking differential clutch disc guide is not serviced separately. It is serviced with the locking differential clutch disc set.**

8. Remove the locking differential clutch disc guide (4).
9. Remove the locking differential cam (2).

LOCKING DIFFERENTIAL CLEANING AND INSPECTION

1. Clean all the parts with an approved solvent.
2. Visually inspect all the parts for excessive wear or breakage. Replace the parts if necessary.
3. Inspect the pinion gear and the side gear teeth for any the following conditions:
   - Wear

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- Cracks
- Scoring
- Spalling

4. Inspect the thrust washers for wear.
5. Inspect the fit of the side gears on the axle shafts.
6. Inspect the differential case for cracks and scoring.

IMPORTANT: Do not replace the thrust sleeve unless it is necessary.

7. Inspect the thrust sleeve for excessive wear.
8. Inspect the side gear bore for scoring. If scoring is present, replace the entire differential.
9. Replace the differential if you find any damage to the case.

LOCKING DIFFERENTIAL CAM UNIT ASSEMBLE (9.5/9.76 INCH AXLE)

Special Tools

J-29710 Differential Side Bearing Installer

1. Apply axle lubricant to each of the locking differential clutch (friction disc) contact area. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

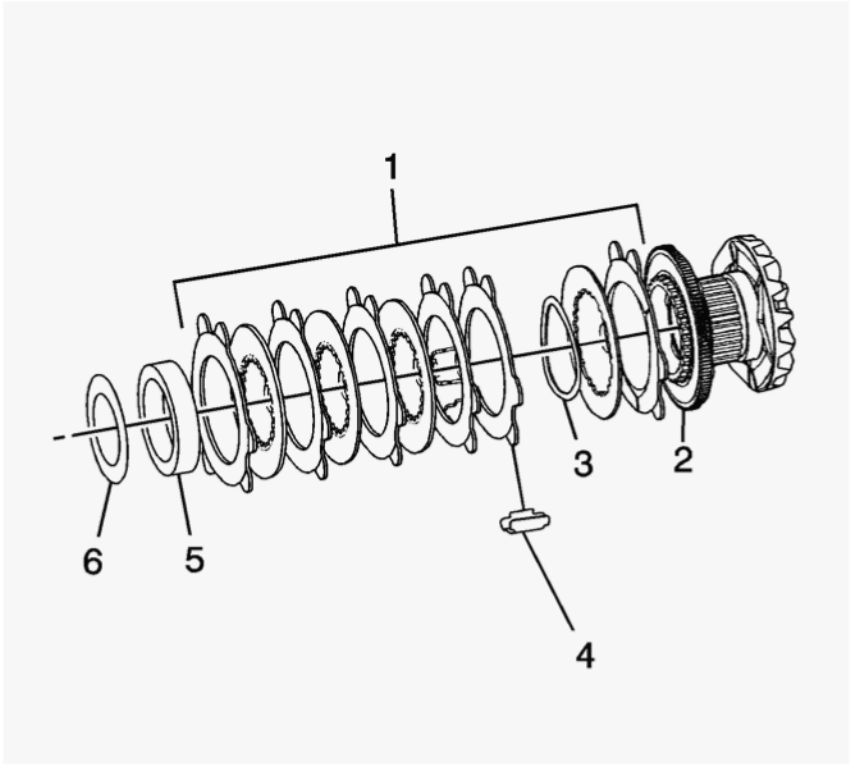


Fig. 287: Disassembled View Of Locking Differential Side Gear Components

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Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential cam (3) on the locking differential side gear (2).

NOTE: **When installing the locking differential clutch disc set, align the splined discs with the teeth on the cam in order to compress the clutch disc assembly.**

3. Install the locking differential clutch disc set (1) on the locking differential side gear (2).
4. Position the locking differential side gear thrust sleeve (5).

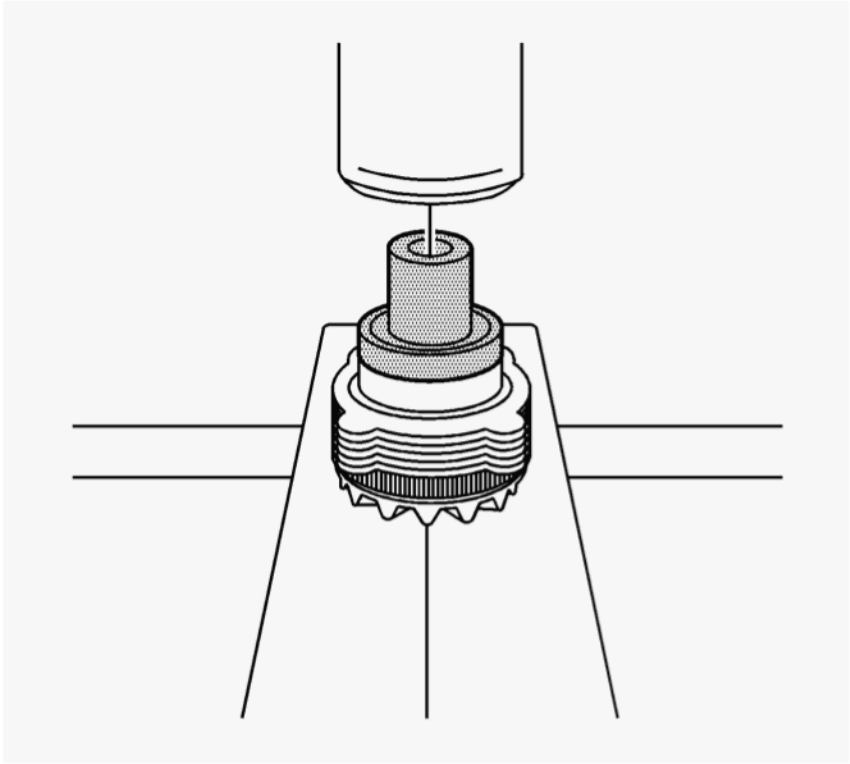


Fig. 288: Installing Thrust Sleeve Onto Cam Side Gear
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If reusing the locking differential side gear thrust sleeve, proceed to step 5. If replacing the locking differential side gear thrust sleeve, proceed to step 6.**

5. Using the **J-29710** installer and a hydraulic press, install the locking differential side gear thrust sleeve until it is fully seated on the locking differential side gear.
6. If the locking differential cam side gear or the locking differential thrust sleeve has been replaced, measure the overall length of the gear assembly by doing the following:
    1. Place the locking differential clutch disc thrust washer on top of the thrust sleeve.
    2. Measure the overall length of the gear assembly from the front of the cam side gear to the back of the locking differential clutch disc thrust washer.
    3. Compare this measurement to the measurement obtained during disassembly.
    4. If the new reading is more than 0.762 mm (0.003 in) higher or lower than the original, select a locking differential clutch disc thrust washer that will return the reading closest to the original reading.
7. Align the ears of all the clutch discs.

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NOTE: **Applying a small amount of grease on the locking differential guides will hod them in place during the installation procedure.**

8. Install the guide clips to the clutch disc assembly and apply chassis grease to the locking differential guides. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

LOCKING DIFFERENTIAL CAM UNIT ASSEMBLE (8.6 INCH AXLE)

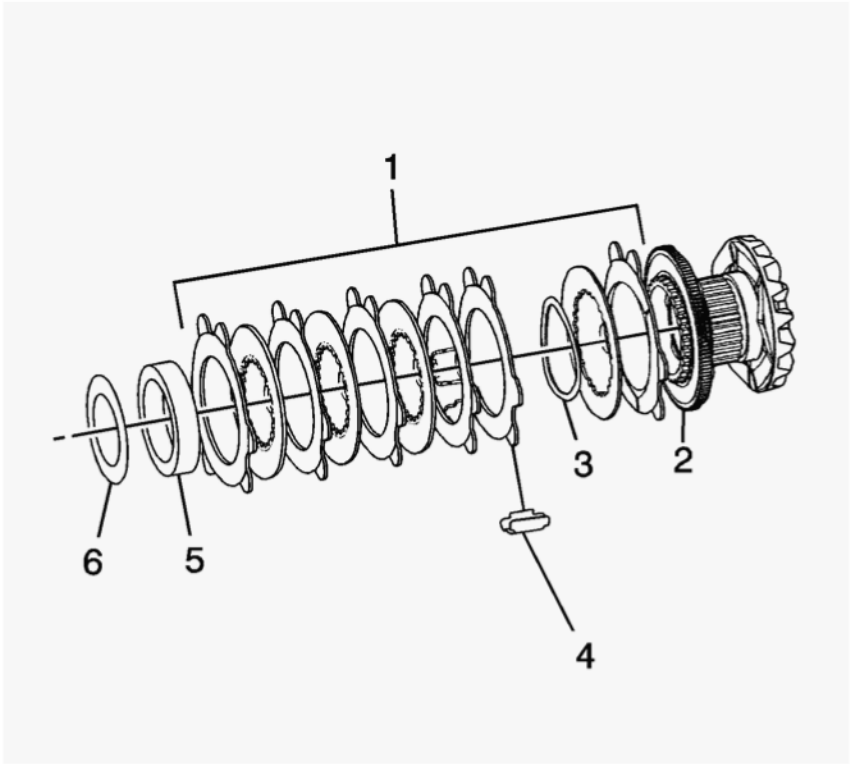


Fig. 289: Disassembled View Of Locking Differential Side Gear Components
Courtesy of GENERAL MOTORS COMPANY

1. Apply axle lubricant to the locking differential clutch (friction disc) contact area. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
2. Install the locking differential cam (3) on the locking differential side gear (2).
3. Install the locking differential clutch disc set (1) on the locking differential side gear (2).
4. Compress the locking differential clutch disc set assembly.

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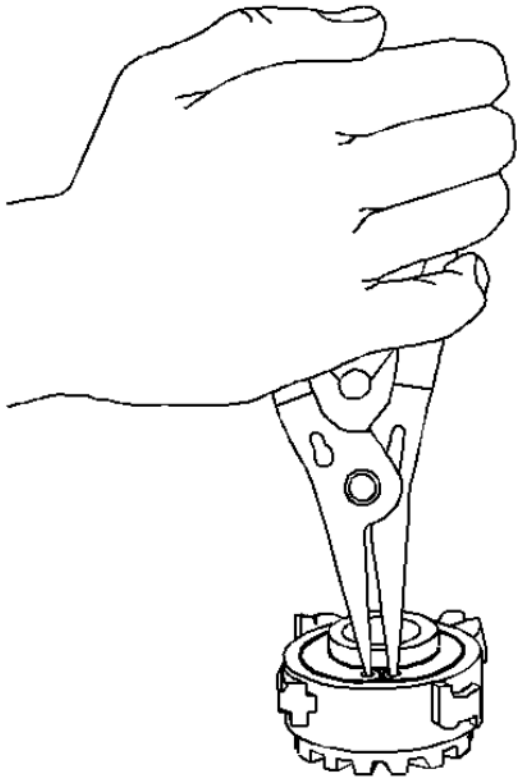


Fig. 290: External Snap Ring Retainer
Courtesy of GENERAL MOTORS COMPANY

5. Using the appropriate tool, install the external span ring retainer.

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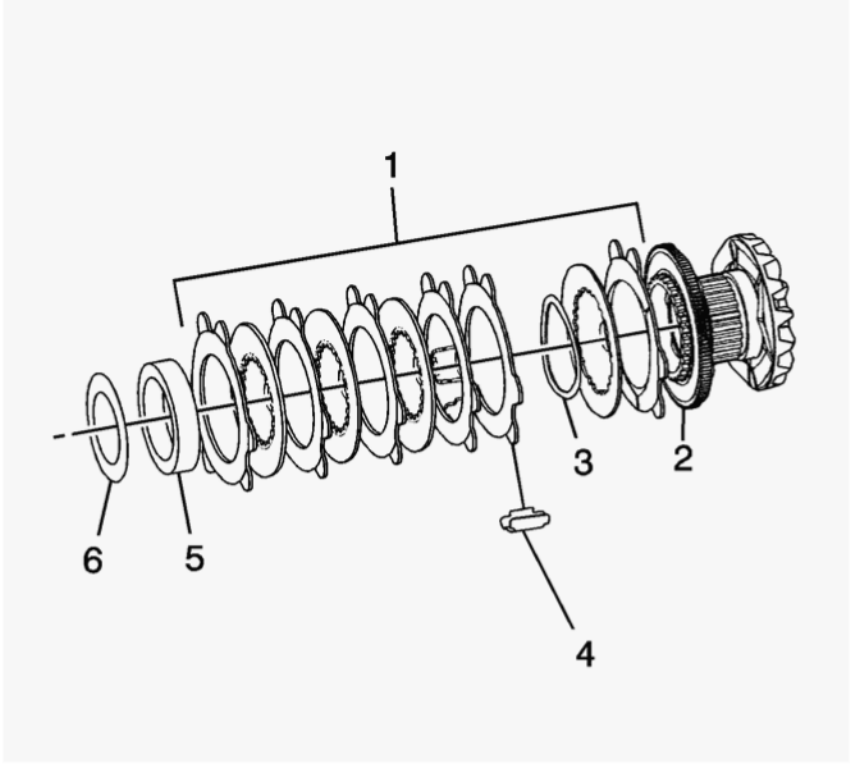


Fig. 291: Disassembled View Of Locking Differential Side Gear Components
Courtesy of GENERAL MOTORS COMPANY

NOTE: **Applying a small amount of grease to the locking differential guides will hold them in place during the installation procedure.**

6. Apply a small amount of chassis grease to hold the locking differential clutch disc guide (5). Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

LOCKING DIFFERENTIAL CAM UNIT ASSEMBLE (10.5 INCH AXLE)

Special Tools

J 29710 Differential Side Bearing Installer Differential Side Bearing Installer

1. Apply axle lubricant to each of the locking differential clutch (friction disc) contact area. Refer to **Adhesives, Fluids, Lubricants, and Sealers**

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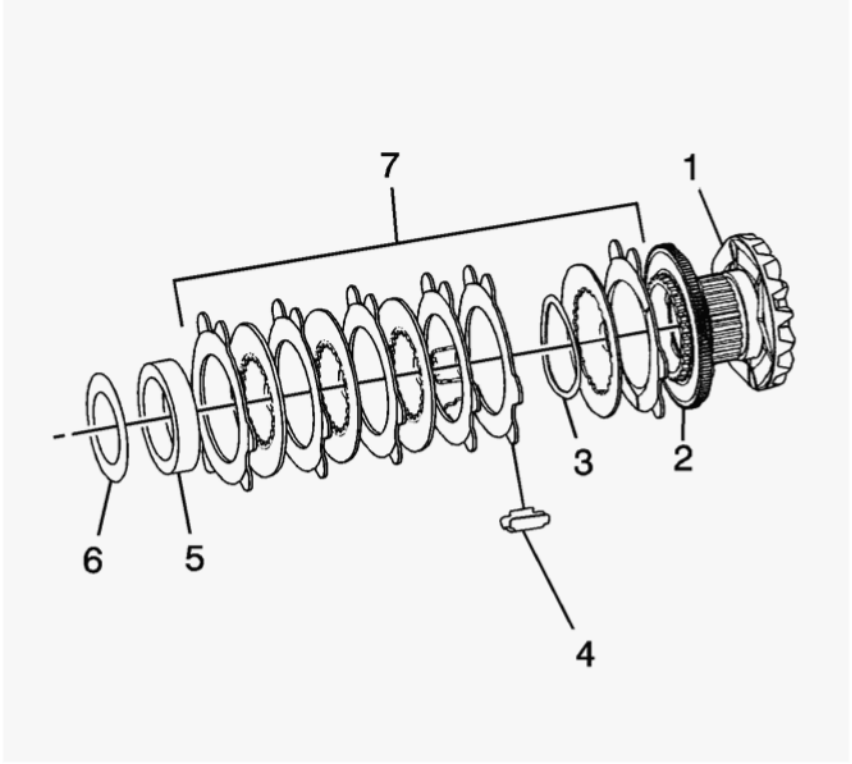


Fig. 292: Disassembled View Of Locking Differential Cam & Locking Differential Side Gear
Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential cam (2) on the locking differential side gear (1).
3. Install the locking differential clutch disc set (7).
4. Position the locking differential side gear thrust sleeve (5) on the locking differential side gear (1).

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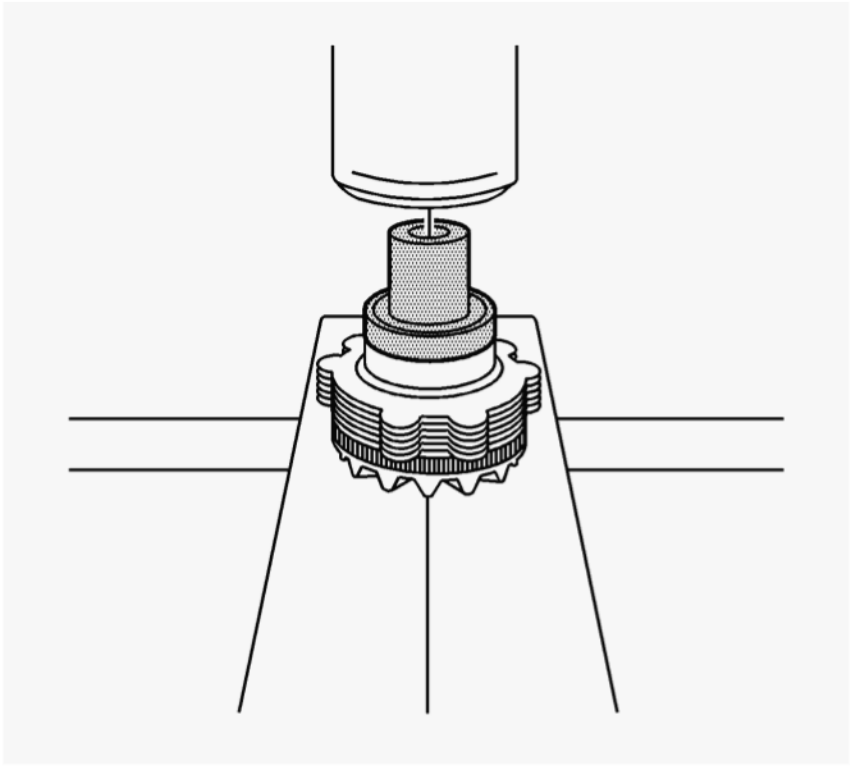


Fig. 293: Installing Thrust Sleeve Onto Cam Side Gear (10.5 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If reusing locking differential side gear thrust sleeve, proceed to step 5. If replacing the locking differential side gear thrust sleeve, proceed to step 6.**

5. Using the **J 29710** installer and a hydraulic press, install the locking differential side gear thrust sleeve until it is fully seated on the locking differential side gear.
6. If the cam side gear or the thrust sleeve has been replaced, measure the overall length of the gear assembly by doing the following:
    1. Place the locking differential clutch disc thrust washer on top of the thrust sleeve.
    2. Measure the overall length of the gear assembly from the front of the cam side gear to the back of the locking differential clutch disc thrust washer.
    3. Compare this measurement to the measurement obtained during disassembly.
    4. If the new reading is more than 0.762 mm (0.003 in) greater than or less than the original, select a locking differential clutch disc thrust washer that will return the reading closest to the original reading.
7. Align the locking differential clutch disc set.

NOTE: **Applying a small amount of chassis grease to the locking differential guides will hold them in place during the installation procedure.**

8. Install the and apply a small amount of chassis grease to the locking differential guides. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY ASSEMBLE (8.6 INCH AXLE)

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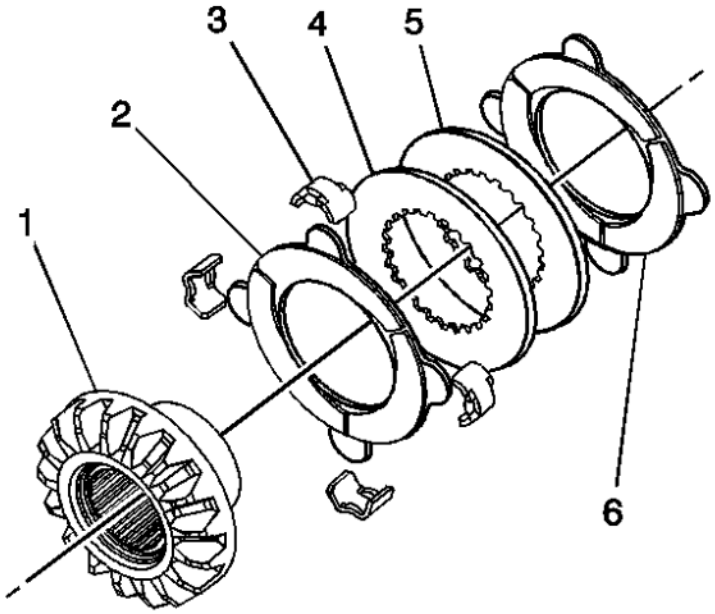


Fig. 294: Locking Differential Clutch Disc Assembly (8.6 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

1. Apply axle lubricant, GM P/N 12378261 (Canadian P/N 10953455) or equivalent meeting GM Specification 9986115, to the surface of each disc.
2. Assemble the right side or bell-end side clutch disc assembly as follows:
    1. Install the two-sided carbon eared disc (2) to the side gear (1).
    2. Install the 1st splined disc (4).
    3. Install the 2nd splined disc (5).
    4. Install the one-sided carbon eared disc (6).
    5. Install the guide clips (3) to the clutch discs (2, 4-6).

    Apply chassis grease, GM P/N 12377985 (Canadian P/N 88901242) or equivalent, to the guide clips in order to hold the clips in place on the disc ears.

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY ASSEMBLE (9.5/9.76 INCH AXLE)

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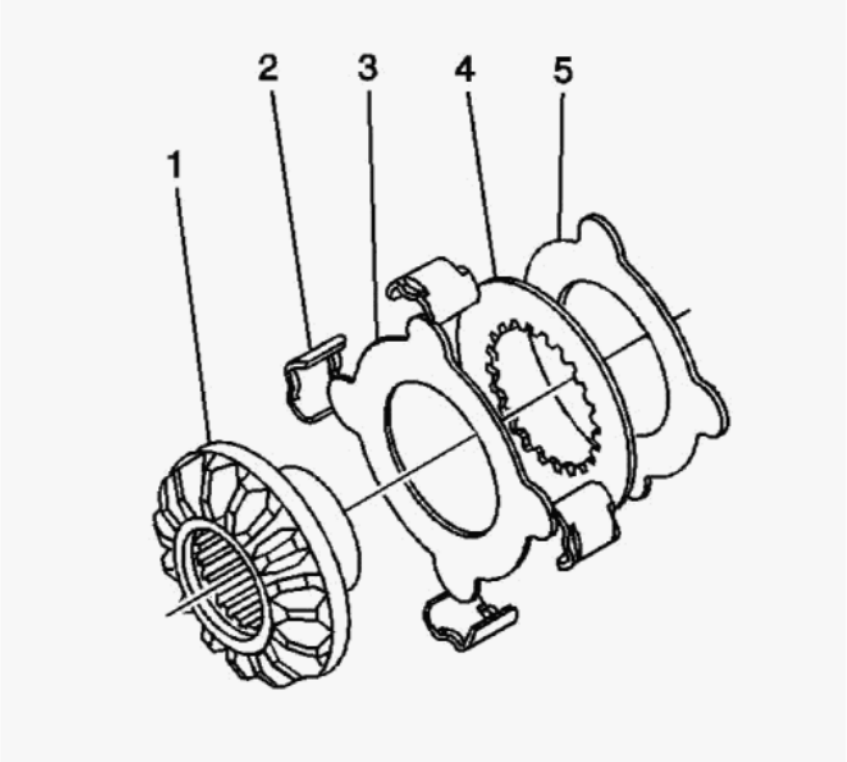


Fig. 295: Guide Clips, Clutch Discs And Splined Discs
Courtesy of GENERAL MOTORS COMPANY

1. Apply proper axle lubricant to the surface of each disc. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
2. Assemble the right side or bell-end side clutch disc assembly as follows:
    1. Install the double sided carbon eared disc (3) to the side gear (1).
    2. Install the 1st splined disc (4).
    3. Install the single sided carbon eared disc (5).
    4. Install the guide clips (2) to the clutch discs (3-5).

    Apply chassis grease to the guide clips in order to hold the clips in place on the disc ears. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

LOCKING DIFFERENTIAL CLUTCH DISC ASSEMBLY ASSEMBLE (10.5 INCH AXLE)

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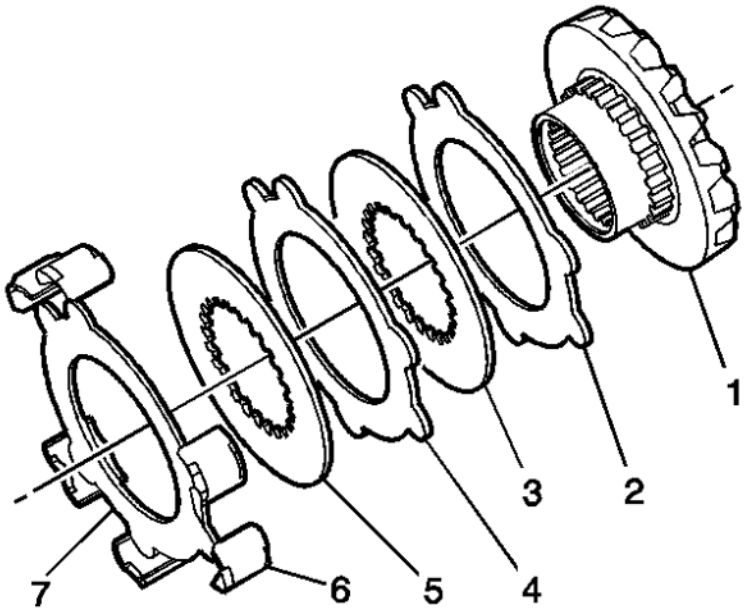


Fig. 296: Locking Differential Clutch Disc Assembly (10.5 Inch Axle)
Courtesy of GENERAL MOTORS COMPANY

1. Apply the proper axle lubricant to the surface of each disc. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
2. Assemble the left side clutch disc assembly as follows:
    1. Install the 1st non-carbon eared disc (2) to the side gear (1).
    2. Install the 1st splined disc (3).
    3. Install the 2nd non-carbon eared disc (4).
    4. Install the 2nd splined disc (5).
    5. Install the 3rd non-carbon eared disc (7).
    6. Align the ears of all the clutch discs.
    7. Install the guide clips (6) to the clutch discs (2-5, 7).

    Apply the proper chassis grease to the guide clips in order to hold the clips in place on the disc ears. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

LOCKING DIFFERENTIAL ADJUSTMENT (8.6/9.5/9.76 INCH AXLES)

Special Tools

- **J 7872** Magnetic Base Indicator Set
- **J 8001** Dial Indicator Set

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Adjustment of the Differential

NOTE: **If it is necessary to replace the left side locking differential side gear cam unit and clutch disc assembly, the right side locking differential side gear and clutch disc assembly, or the thrust block, the entire differential must be adjusted. The differential is adjusted using selective thickness thrust washers between the clutch disc assemblies and the case and/or different selective thickness thrust blocks. When adjusting the differential, note the following:**

NOTE: **Proper clearance between parts is critical to the operation of the unit.**

- Assemble the clutch disc assemblies properly.
- Adjust the backlash and thrust block clearance in the following order:
  1. The left side gear backlash
  2. The right side gear backlash
  3. The thrust block clearance

Left Side Gear Backlash Adjustment

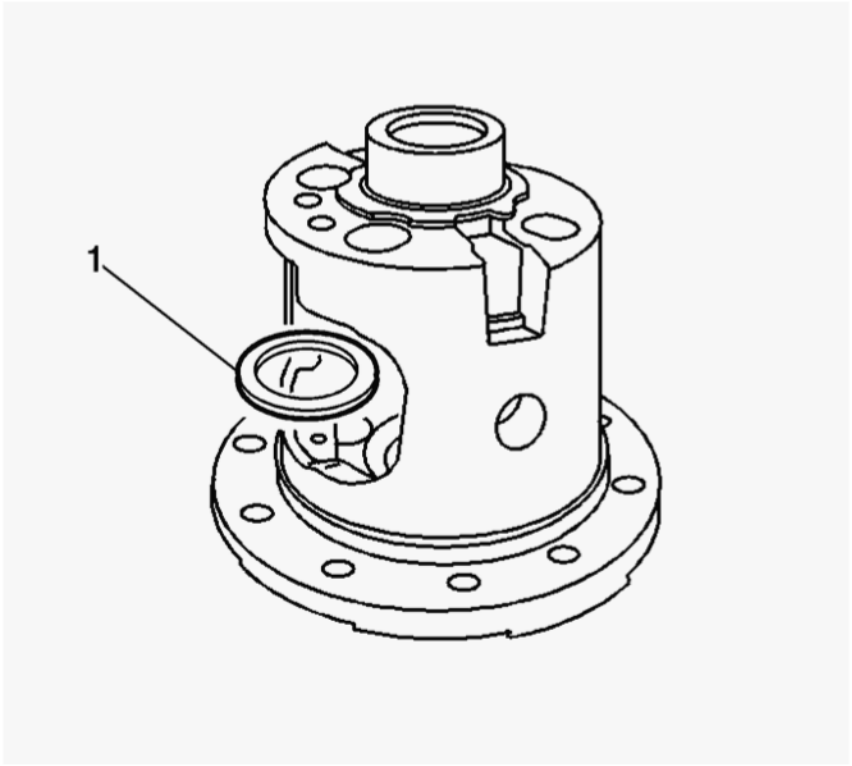


Fig. 297: Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

1. Install the new locking differential clutch disc thrust washer.

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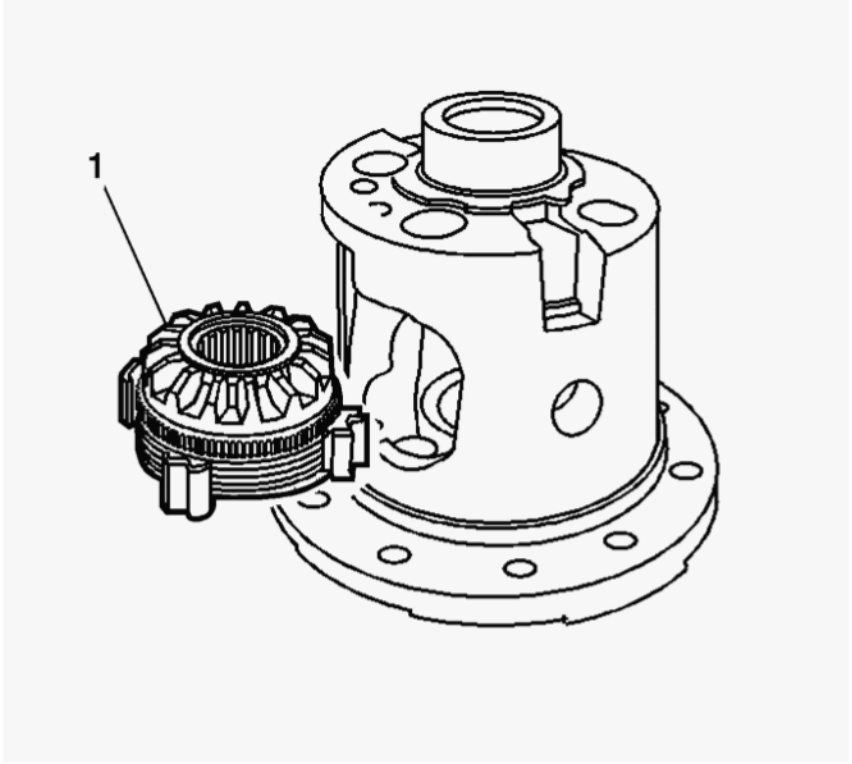


Fig. 298: Left Side Gear Cam Unit And Clutch Disc Assembly
Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential side gear cam unit and clutch disc assembly.

NOTE: **Align the openings of the differential pinion gears and the differential pinion gear thrust washer to the pinion shaft opening in the differential case.**

3. Install the differential pinion gears with the differential pinion gear thrust washers into the differential case.

NOTE:

- **It may be necessary to press down on the locking differential side gear cam unit in order to align the pinion gear shaft opening with the pinion shaft opening in the differential case.**
- **If the pinion shaft cannot be installed after pressing on the locking differential side gear cam unit, replace the locking differential clutch disc gear thrust washer with a thinner washer.**
- **Tighten the pinion shaft lock bolt finger tight.**

4. Install the pinion shaft and the bolt.
5. Rotate the pinion gear closest to the lock bolt so that one of the teeth is pointing downward, square to the ring gear flange.
6. Install a brass drift between the locking differential side gear cam unit and the pinion shaft.
7. Press the brass drift in far enough in order to compress the clutch discs.

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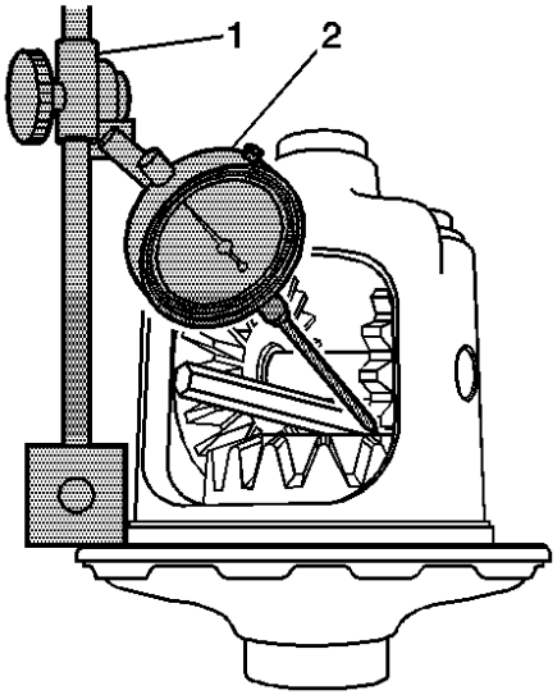


Fig. 299: Measuring Backlash Of Differential Pinion Gear & Side Gear
Courtesy of GENERAL MOTORS COMPANY

8. Measure the backlash of the differential pinion gear and the locking differential side gear cam unit by doing the following:
    1. Install the **J 7872** base (1) and the **J 8001** indicator (2) to the ring gear flange.
    2. Place the contact pad of the **J 8001** indicator (2) on one of the teeth of the pinion gear closest to the pinion shaft lock bolt and zero the gauge.
    3. Pull the pinion gear firmly into the differential case seat.
    4. Rotate the pinion gear back and forth.

    NOTE:
    - **If the backlash is greater than, install a thicker locking differential clutch disc thrust washer and recheck the backlash.**
    - **If the backlash is less than, install a thinner locking differential clutch disc thrust washer and recheck the backlash**

    5. The backlash between the differential pinion gear and the locking differential side gear cam unit should be:
        - For the 8.6 inch axle, 0.254-0.406 mm (0.010-0.016 in).
        - For the 9.5/9.76 LD axle, 0.279-0.432 mm (0.011-0.017 in).
9. Locking differential clutch disc thrust washers are available in the following sizes:

Washer Sizes

- 0.559 mm (0.022 in)
- 0.686 mm (0.027 in)

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- 0.813 mm (0.032 in)
- 0.914 mm (0.036 in)
- 1.016 mm (0.040 in)
- 1.118 mm (0.044 in)
- 1.219 mm (0.048 in)
- 1.321 mm (0.052 in)

Right Side Gear Backlash Adjustment

1. If necessary, remove the following from the differential case:
    1. The pinion lock shaft bolt
    2. The pinion shaft
    3. The differential pinion gears
    4. The differential pinion gear thrust washers
    5. The left side locking differential side gear cam unit and clutch disc assembly
2. Install the differential side gear shim into the right side of the differential case.
3. Install the locking differential side gear and clutch disc assembly.
4. Align the openings of the differential pinion gears and the differential pinion gear thrust washers to the pinion shaft opening in the differential case.

NOTE:

- **Press down on the locking differential side gear and install the pinion shaft.**
- **If the side gear cannot be pressed down far enough to install the pinion shaft, replace the side gear shim with a thinner shim.**

5. Install the differential pinion gears with the differential pinion thrust washers into the differential case.

NOTE: **Tighten the pinion shaft lock bolt finger tight.**

6. Install the pinion shaft lock and the bolt.
7. Rotate the differential pinion gear so that one of the teeth is pointing downward, square to the ring gear flange.

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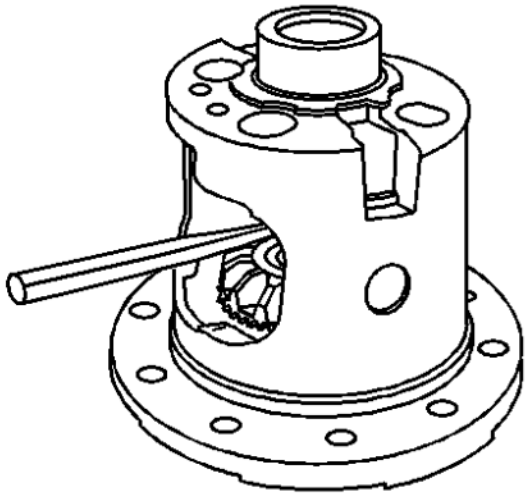


Fig. 300: Installing Brass Drift Between Locking Differential Side Gear & Pinion Shaft
Courtesy of GENERAL MOTORS COMPANY

8. Install a brass drift between the locking differential side gear and the pinion shaft.
9. Press the brass drift in enough in order to compress the clutch discs.

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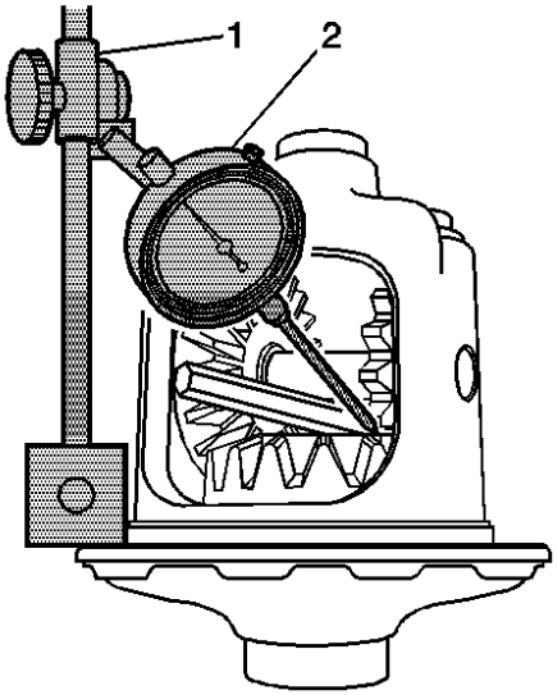


Fig. 301: Measuring Backlash Of Differential Pinion Gear & Side Gear
Courtesy of GENERAL MOTORS COMPANY

10. Measure the backlash of the pinion gear and the right side gear by doing the following:
    1. Install the **J 7872** base (1) and the **J 8001** indicator (2) to the ring gear flange.
    2. Place the contact pad of the **J 8001** indicator (2) on one of the teeth of the pinion gear closest to the pinion shaft lock bolt and zero the gauge.
    3. Pull the pinion gear firmly into the differential case seat.
    4. Rotate the pinion gear back and forth.

NOTE:
- **If the backlash is greater than, install a thicker locking differential clutch disc thrust washer and recheck the backlash.**
- **If the backlash is less than, install a thinner locking differential clutch disc thrust washer and recheck the backlash.**

    5. The backlash between the differential pinion gear and the locking differential side gear cam unit should be:
        - For the 8.6 inch axle 0.076-0.229 mm (0.003-0.009 in).
        - For the 9.5/9.76 LD axle 0.051-0.203 mm (0.002-0.008 in).

Differential side gear shims are available in the following sizes:

Shim Sizes

- 0.254 mm (0.010 in)

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- 0.381 mm (0.015 in)
- 0.508 mm (0.020 in)
- 0.635 mm (0.025 in)
- 0.762 mm (0.030 in)
- 0.889 mm (0.035 in)
- 1.016 mm (0.040 in)
- 1.143 mm (0.045 in)

Thrust Block Clearance Adjustment

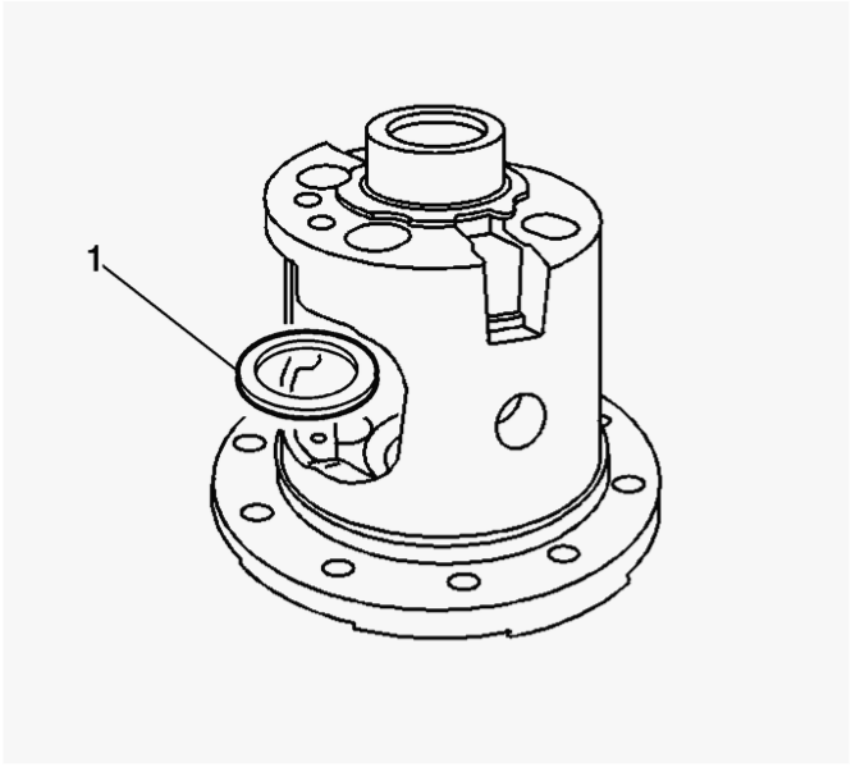


Fig. 302: Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The left and right side gear backlash measurements must be done before the thrust block measurement can be completed.**

1. Install the locking differential clutch disc thrust washer into the left side or flange-end of the differential case.

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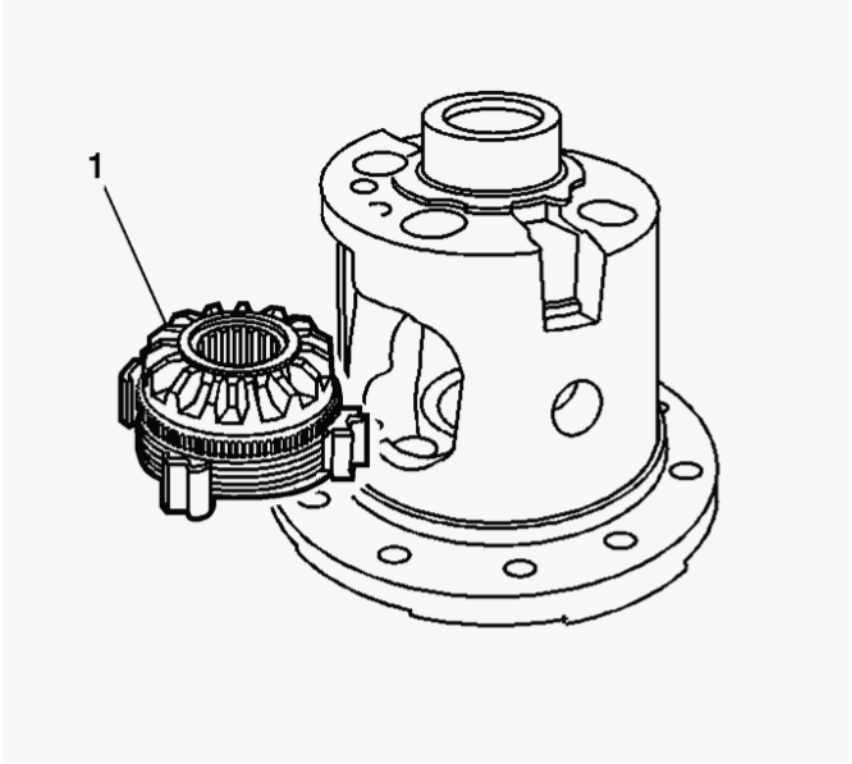


Fig. 303: Left Side Gear Cam Unit And Clutch Disc Assembly
Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential side gear cam unit and clutch disc assembly into the left side or flange-end of the differential case.
3. Install the differential side gear shim into the right side of the differential case.
4. Install the locking differential side gear and clutch disc assembly into the right side of the differential case.

NOTE: **Tighten the pinion shaft bolt finger tight.**

5. Install the pinion shaft and the bolt.

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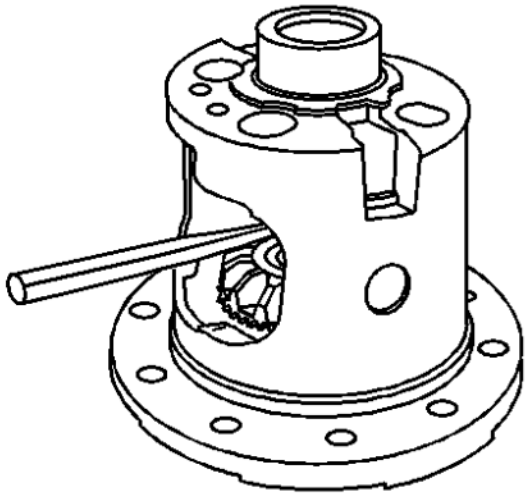


Fig. 304: Installing Brass Drift Between Locking Differential Side Gear & Pinion Shaft
Courtesy of GENERAL MOTORS COMPANY

6. Install a brass drift between the left locking differential side gear cam unit and the pinion shaft.
7. Press the brass drift in far enough in order to compress the clutch disc assembly and hold the left side gear assembly in place.
8. Install a brass drift between the right side locking differential side gear and the pinion shaft.
9. Press the brass drift in far enough in order to hold the right side gear assembly in place.

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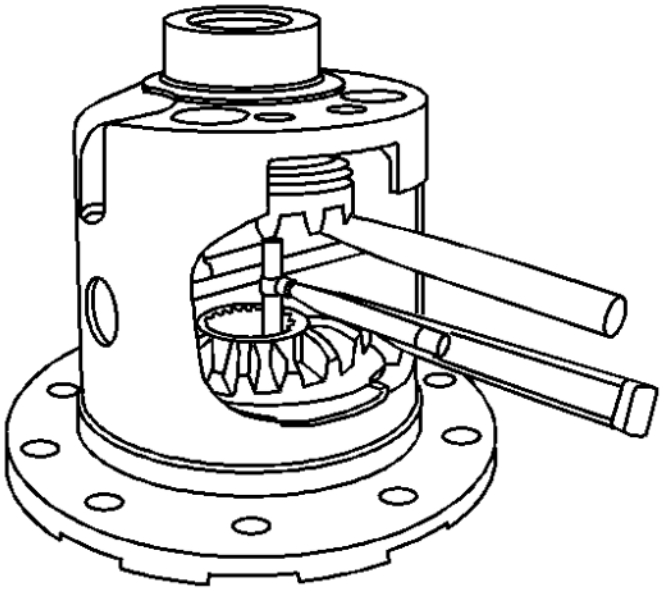


Fig. 305: Measuring Distance Between Side Gear Faces
Courtesy of GENERAL MOTORS COMPANY

NOTE: **DO NOT measure the distance between the side gear teeth.**

10. Using a 25.4-50.8 mm (1-2 in) telescoping gauge, measure the distance between the side gear faces.
11. Measure the telescoping gauge with a micrometer and record the measurement.

NOTE: **If the measurement is equal to one of the thrust blocks sizes available, then select that thrust block.**

12. Compare the measurement obtained in step 11 to the thrust block sizes available.

NOTE: **For example, if the measurement is 33.833 mm (1.332 in), select the 33.782 mm (1.330 in) thrust block.**

13. If the measurement obtained in step 11 is not equal to one of the thrust blocks sizes available, then select the thrust block that is smaller than the measurement.

NOTE: **The backlash must be rechecked and adjusted to specification anytime the left and/or the right thrust washers are replaced.**

14. If the measurement obtained in step 11 is less than 33.578 mm (1.322 in) for the 8.6 inch axle or 40.488 mm (1.622 in) for the 9.5/9.76 LD axle, then reduce the left side gear thrust washer or the right side gear shim thickness in order to increase the thrust block opening.
15. If the measurement obtained in step 11 is greater than 34.290 mm (1.350 in) for the 8.6 inch axle or 41.120 mm (1.622 in) for the 9.5/9.76 LD axle, then increase the left side gear thrust washer or the right side gear shim thickness in order to decrease the thrust block opening.
16. Recheck the left and/or right side gear backlash and adjust as necessary.

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17. Recheck the thrust block clearance and adjust as necessary.
18. Assemble the differential. Refer to **Locking Differential Assemble (8.6/9.5/9.76 Inch Axles)**.

LOCKING DIFFERENTIAL ADJUSTMENT (10.5 INCH AXLE)

Special Tools

- **J-7872** Magnetic Base Dial Indicator
- **J-8001** Dial Indicator Set
- **J-34672** Depth Micrometer
- **J-34673** Flat Gauge Bar

Adjustment of the Differential

NOTE: **If it is necessary to replace the right side cam gear and clutch disc assembly, the left hand side gear and clutch disc assembly, or the thrust block, the entire differential must be adjusted. The differential is adjusted using selective thickness thrust washers between the clutch pack assemblies and case and/or different selective thickness thrust blocks.**

When adjusting the differential, note the following:

NOTE: **Proper clearance between the parts is critical to the operation of the unit.**

- Build up the clutch disc packs properly.
- Adjust the backlash and thrust block clearance in the following order:
    1. The left side gear backlash
    2. The right side gear backlash
    3. The thrust block clearance

Left Side Gear Backlash Adjustment

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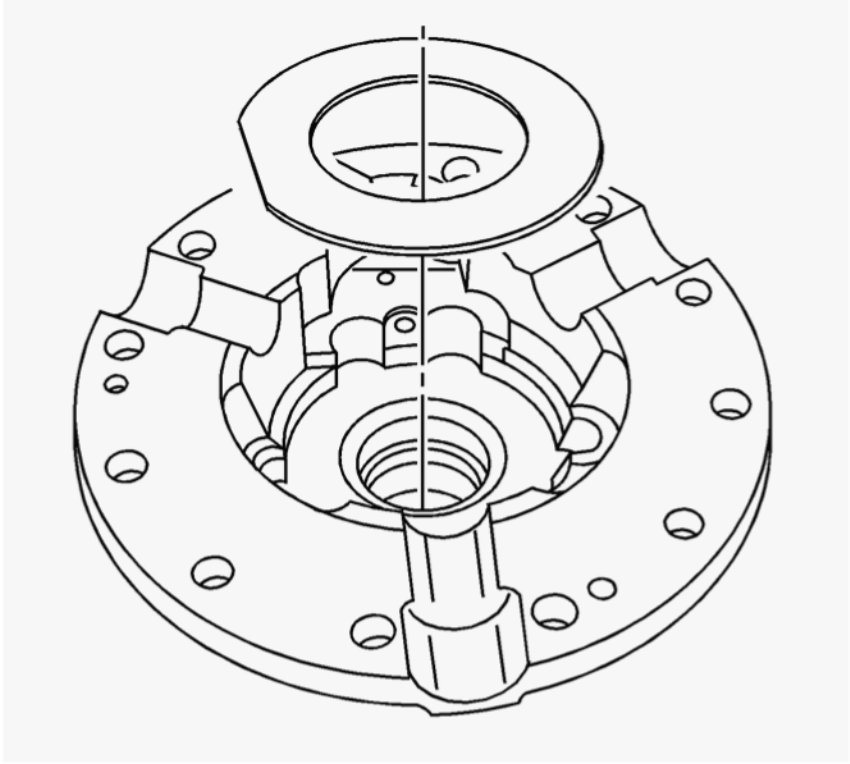


Fig. 306: Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

1. Install the differential side gear shim.

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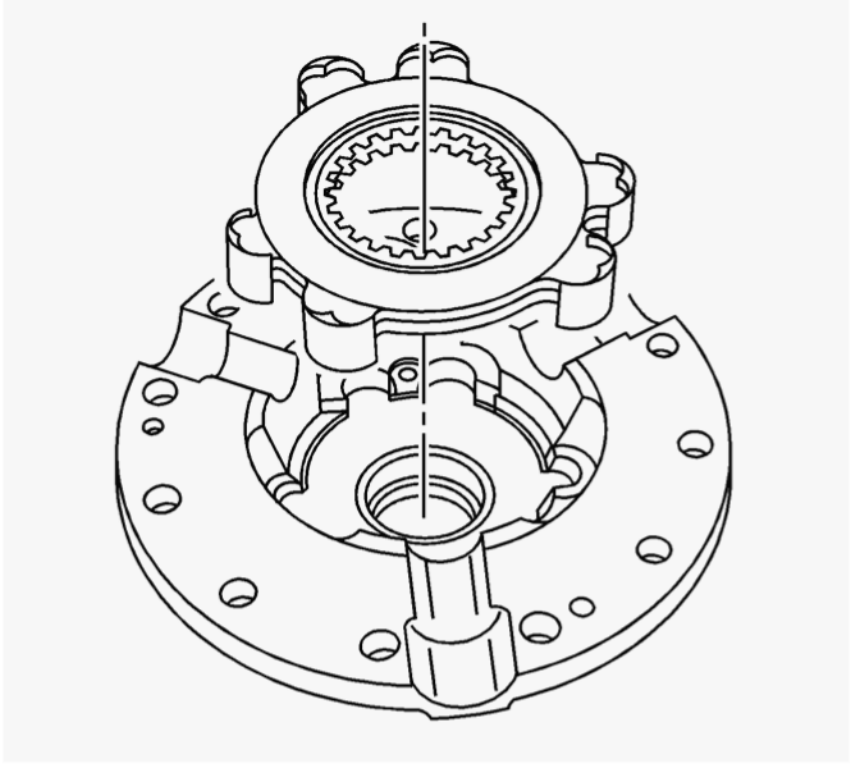


Fig. 307: Left Side Clutch Plates And Guide Clips
Courtesy of GENERAL MOTORS COMPANY

2. Install the clutch pack assembly.

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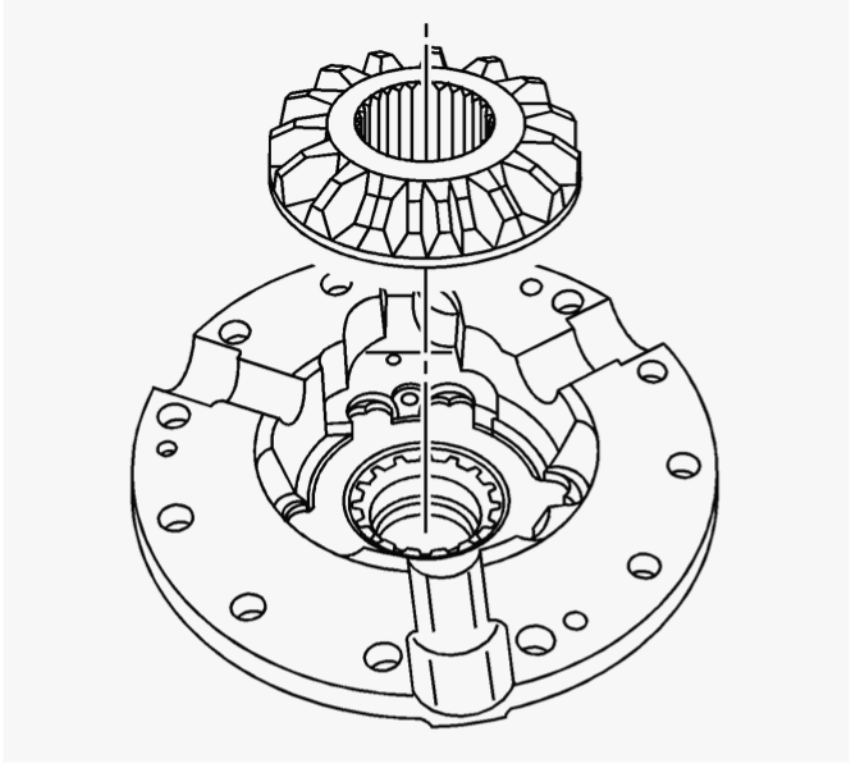


Fig. 308: Locking Differential Side Gear
Courtesy of GENERAL MOTORS COMPANY

3. Install the differential side gear.

NOTE: **The washers must be large enough in order to fit over the differential side gear, but not too large to where they will cause an interference with the pinion gear and spider assembly.**

4. Assemble a set of washers, a nut, and a bolt long enough in order to hold the side gear in place.

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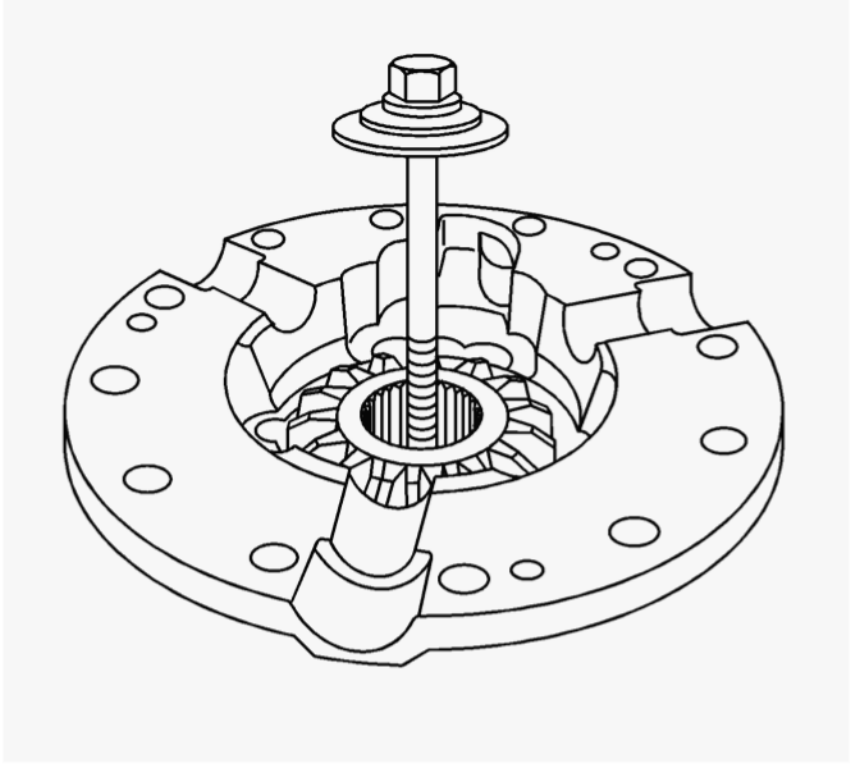


Fig. 309: Installing Bolt & Washer Assembly Through Differential Case Half
Courtesy of GENERAL MOTORS COMPANY

5. Install the bolt and washer assembly through the differential case half.
6. Install a second set of washers and the nut onto the bolt extending through the differential case half.
7. Install the differential case half into a vise.
8. Clamp on the nut on the bottom of the differential case.

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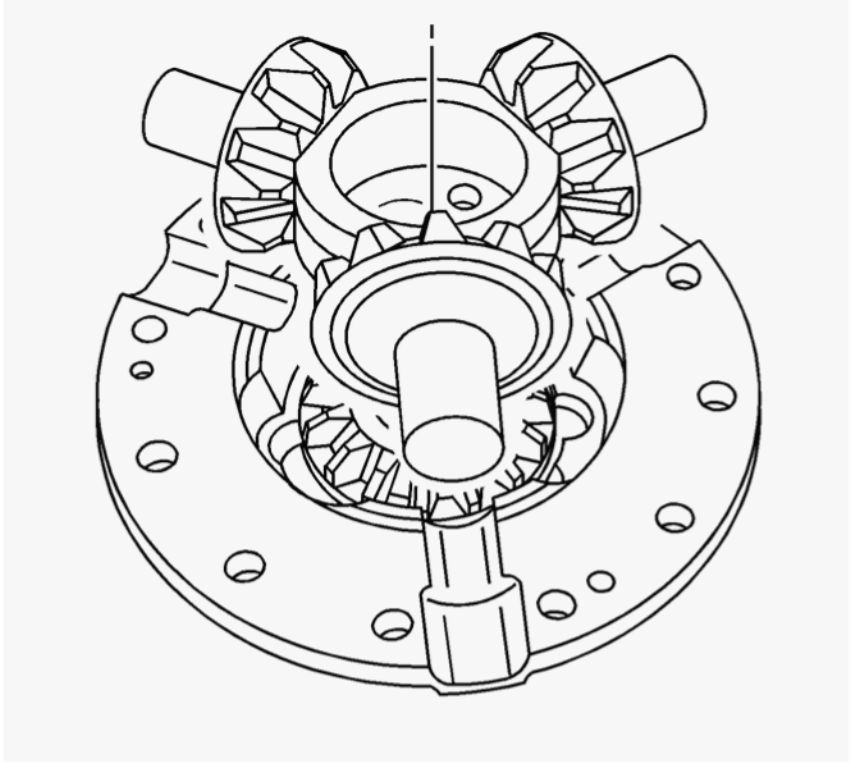


Fig. 310: Differential Case Components
Courtesy of GENERAL MOTORS COMPANY

9. Install the differential pinion gears, the differential pinion gear thrust washers and the locking differential spider into the case half.
10. Loosen the bolt in order to turn the differential side gear.
11. Index the pinion gear so that one tooth is pointing downward, perpendicular to the case half face.
12. Tighten the bolt until the clutch discs are compressed.

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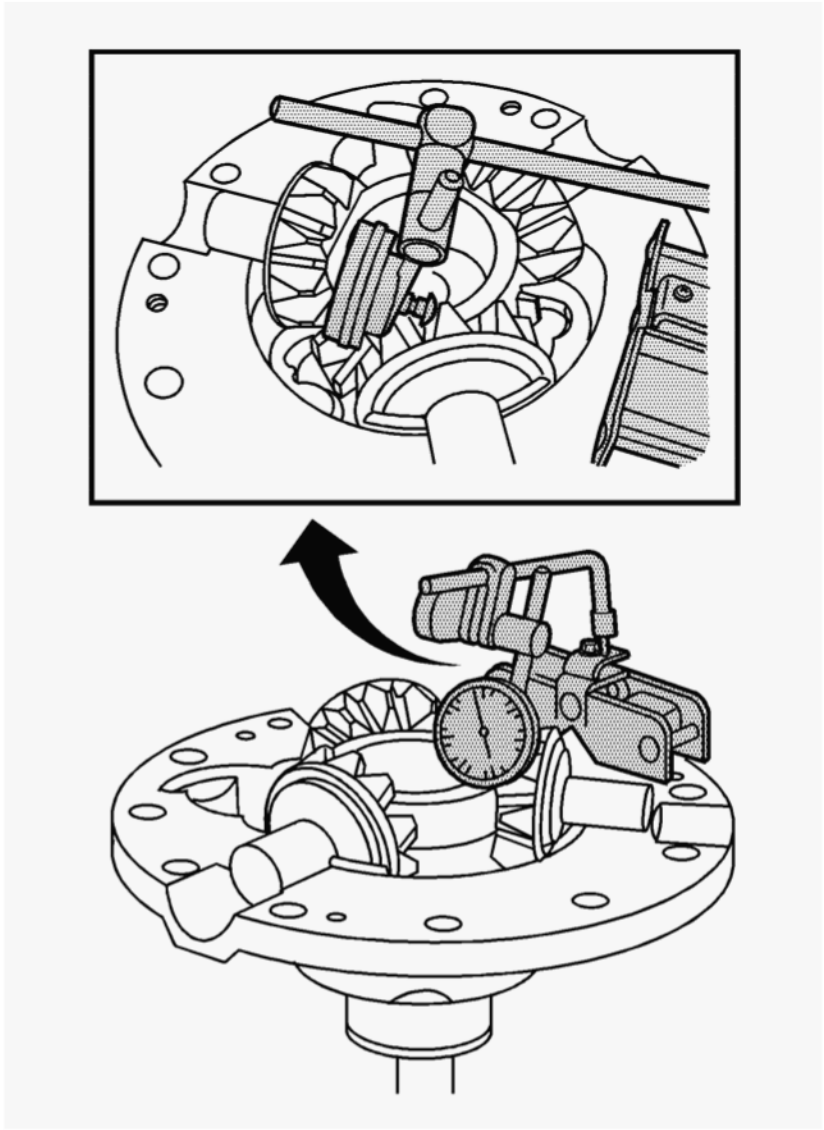


Fig. 311: Measuring Differential Pinion Gear To Locking Differential Side Gear Backlash
Courtesy of GENERAL MOTORS COMPANY

13. Install the **J-7872** indicator onto the differential case.
14. Loosely clamp the **J-8001** dial indicator set onto the stem of the **J-7872** indicator.
15. Place the contact pad of the **J-8001** dial indicator set on the tooth that is perpendicular to the differential side gear.
16. Preload the dial of the **J-8001** dial indicator set approximately one turn clockwise.
17. Tighten the lock nut on the **J-7872** indicator finger tight.
18. Turn the dial of the **J-8001** dial indicator set until the needle and the dial face indicate ZERO.

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NOTE: **In the following procedure, DO NOT unseat the locking differential spider. This will make the backlash reading inaccurate.**

19. Measure the differential pinion gear to locking differential side gear backlash by performing the following steps:
    - Pull the pinion gear firmly into the seat.
    - Rotate the pinion gear back and forth while reading the dial indicator.
    - Record the measurement.

NOTE: **Measure the differential pinion gear to locking differential side gear backlash on the other 2 pinion gears**

20. The measured backlash between the differential pinon gear and locking differential side gear should be 0.051-0.203 mm (0.002-0.008 in).
21. If the backlash is too large, install a thicker differential side gear shim and recheck the backlash.
22. If the backlash is too small, use a thinner differential side gear shim and recheck the backlash.

Differential side gear shims are available in the following sizes:

Shim Sizes

- 0.254 mm (0.010 in)
- 0.381 mm (0.015 in)
- 0.508 mm (0.020 in)
- 0.635 mm (0.025 in)
- 0.762 mm (0.030 in)
- 0.899 mm (0.035 in)
- 1.016 mm (0.040 in)
- 1.143 mm (0.045 in)
- 1.270 mm (0.050 in)
- 1.397 mm (0.055 in)
- 1.524 mm (0.060 in)

Right Side Gear Backlash Adjustment

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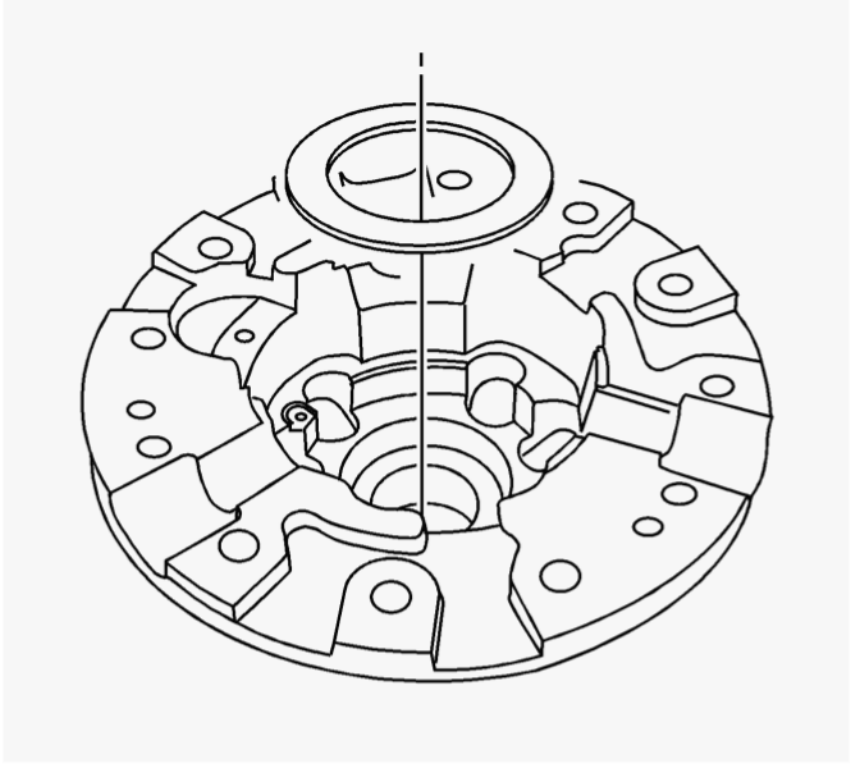


Fig. 312: Right Side Locking Differential Clutch Disc Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

1. Install the locking differential clutch disc thrust washer.

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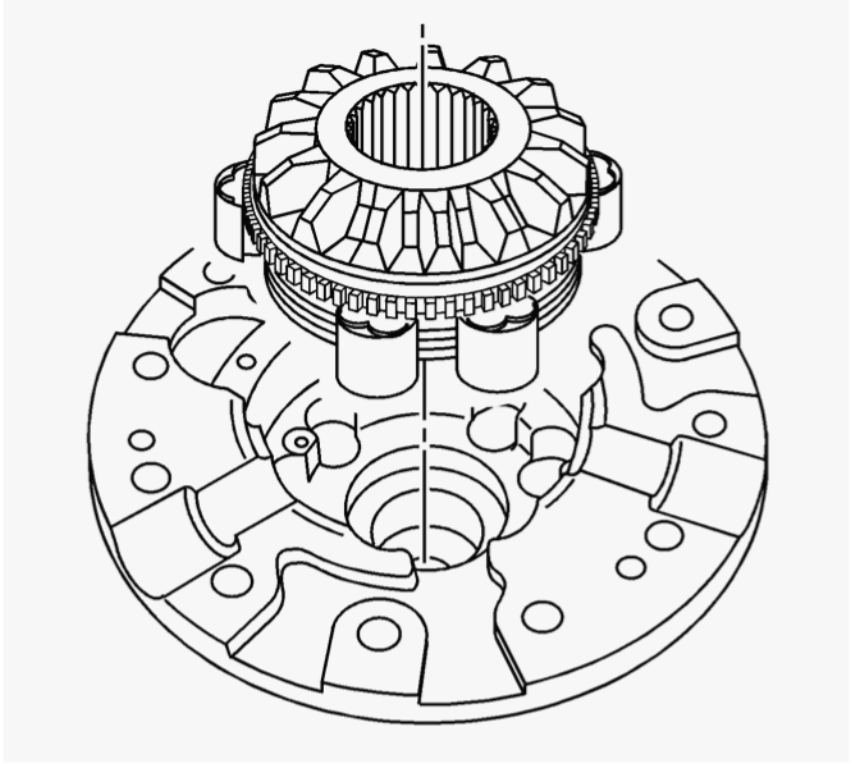


Fig. 313: Right Side Cam Unit And Clutch Plate Assembly
Courtesy of GENERAL MOTORS COMPANY

2. Install the differential side gear cam unit and clutch pack assembly.

NOTE: **The washers must be large enough in order to fit over the differential side gear but not too large to where they will cause an interference with the pinion gear and spider assembly.**

3. Assemble a set of washers, a nut, and a bolt long enough in order to hold the side gear in place.

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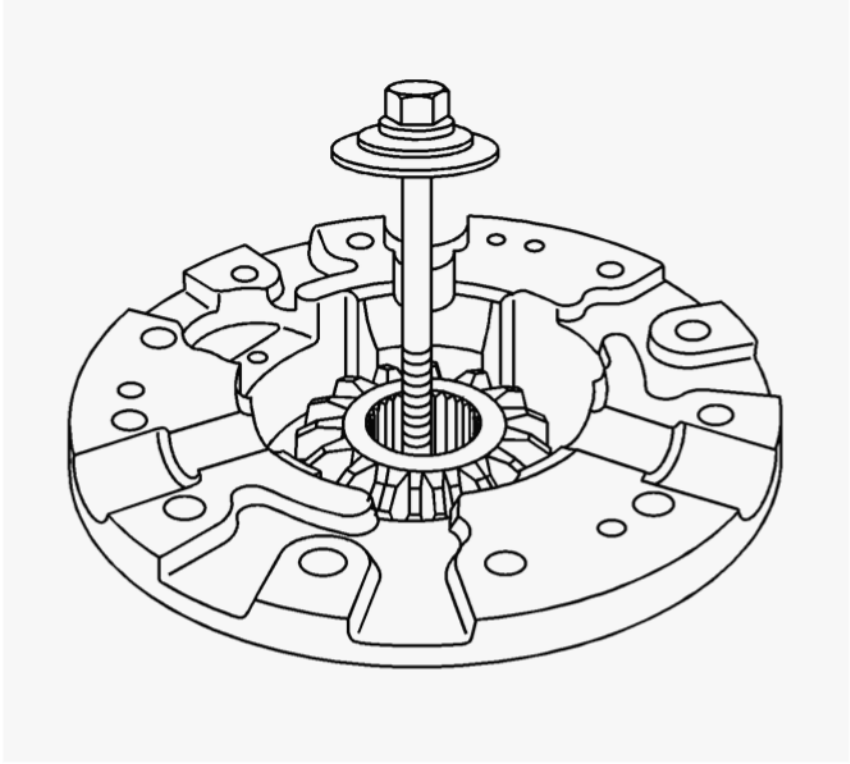


Fig. 314: Installing Bolt And Washer Assembly Through Differential Case Half
Courtesy of GENERAL MOTORS COMPANY

4. Install the bolt and washer assembly through the differential case half.
5. Install a second set of washers and the nut onto the bolt extending through the differential case half.
6. Install the differential case half into a vise.
7. Clamp on the nut on the bottom of the differential case.

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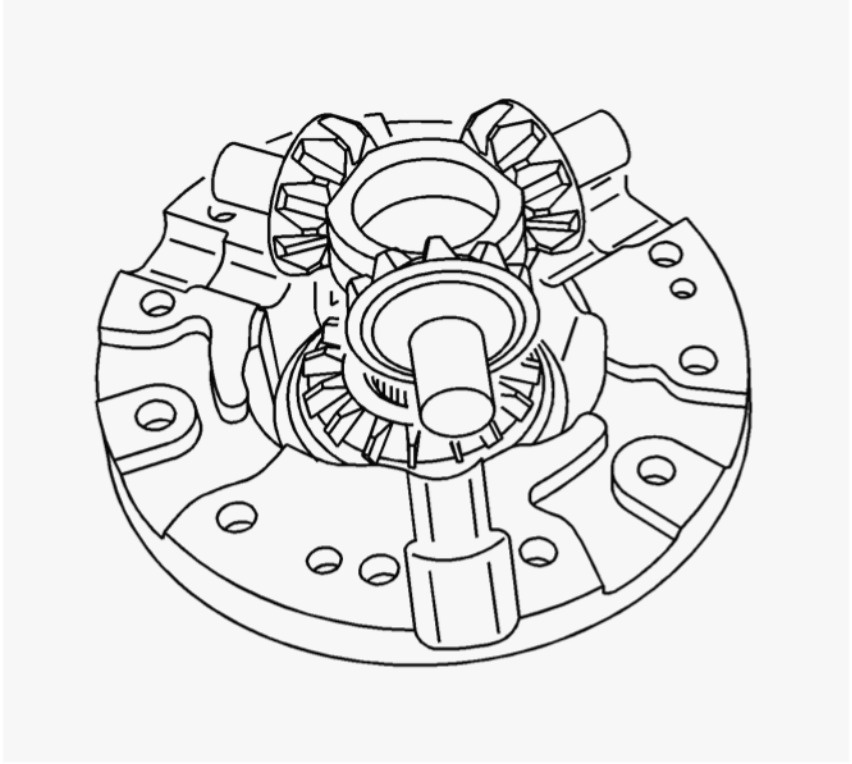


Fig. 315: Differential Pinion Gears, Thrust Washers And Spider
Courtesy of GENERAL MOTORS COMPANY

8. Install the differential pinion gears, the differential pinion gear thrust washers and the locking differential spider into the case half.
9. Loosen the bolt in order to turn the differential side gear.
10. Index the pinion gear so that one tooth is pointing downward, perpendicular to the case half face.
11. Tighten the bolt until the clutch plates are compressed.

NOTE: **In the following procedure, DO NOT unseat the locking differential spider. This will make the backlash reading inaccurate.**

12. Measure the differential pinion gear to locking differential side gear backlash by performing the following steps:
    - Pull the pinion gear firmly into the seat.
    - Rotate the pinion gear back and forth while reading the dial indicator.
    - Record the measurement.
13. The backlash between the differential pinon gear and locking differential side gear should be between 0.279-0.432 mm (0.011-0.017 in).
14. If the backlash is too large, install a thicker locking differential side gear thrust washer and recheck the backlash.
15. If the backlash is too small, use a thinner locking differential side gear thrust washer and recheck the backlash.
16. Locking differential side gear thrust washers are available in the following sizes:

Washer Sizes

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- 0.559 mm (0.022 in)
- 0.686 mm (0.027 in)
- 0.813 mm (0.032 in)
- 0.914 mm (0.036 in)
- 1.016 mm (0.040 in)
- 1.067 mm (0.042 in)
- 1.118 mm (0.044 in)
- 1.219 mm (0.048 in)
- 1.321 mm (0.052 in)

Thrust Block Clearance Adjustment

NOTE: **The left and right side gear backlash measurements must be done before the thrust block measurement can be completed.**

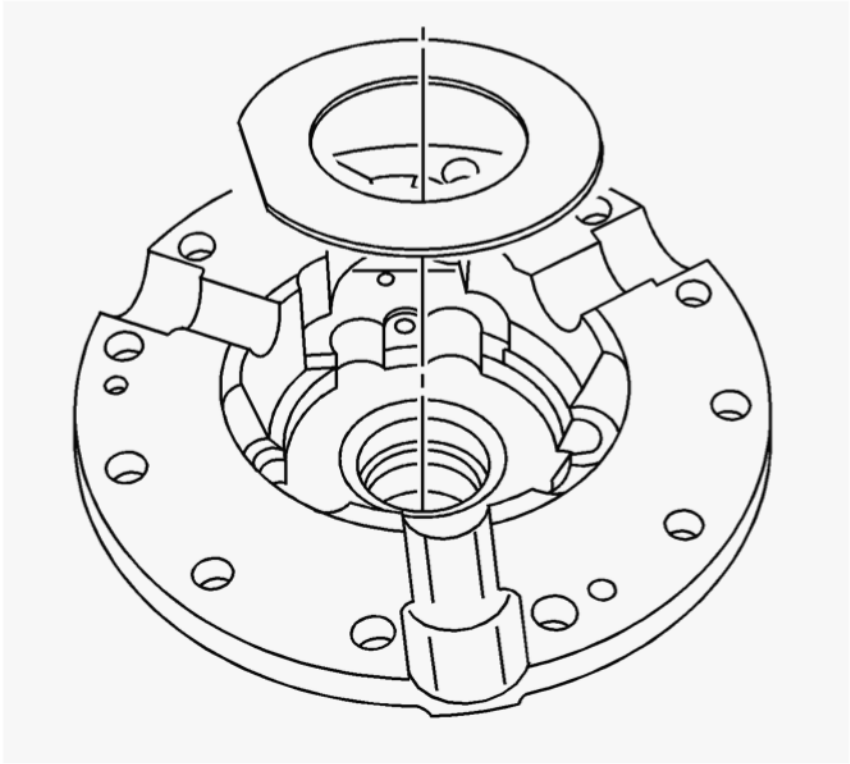


Fig. 316: Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

1. Install the differential side gear shim.

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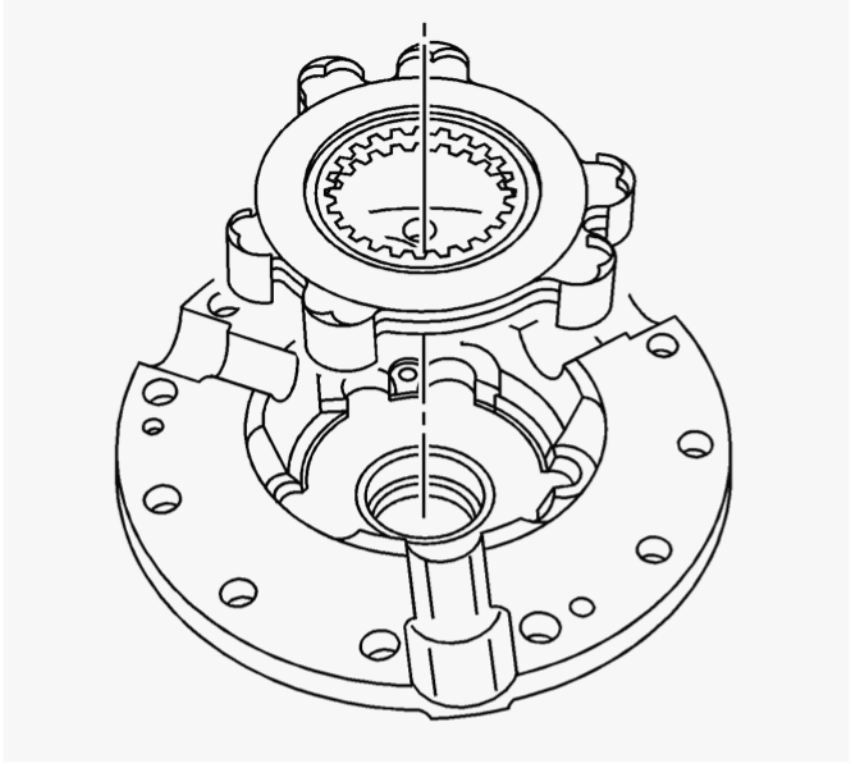


Fig. 317: Left Side Clutch Plates And Guide Clips
Courtesy of GENERAL MOTORS COMPANY

2. Install the clutch pack assembly.

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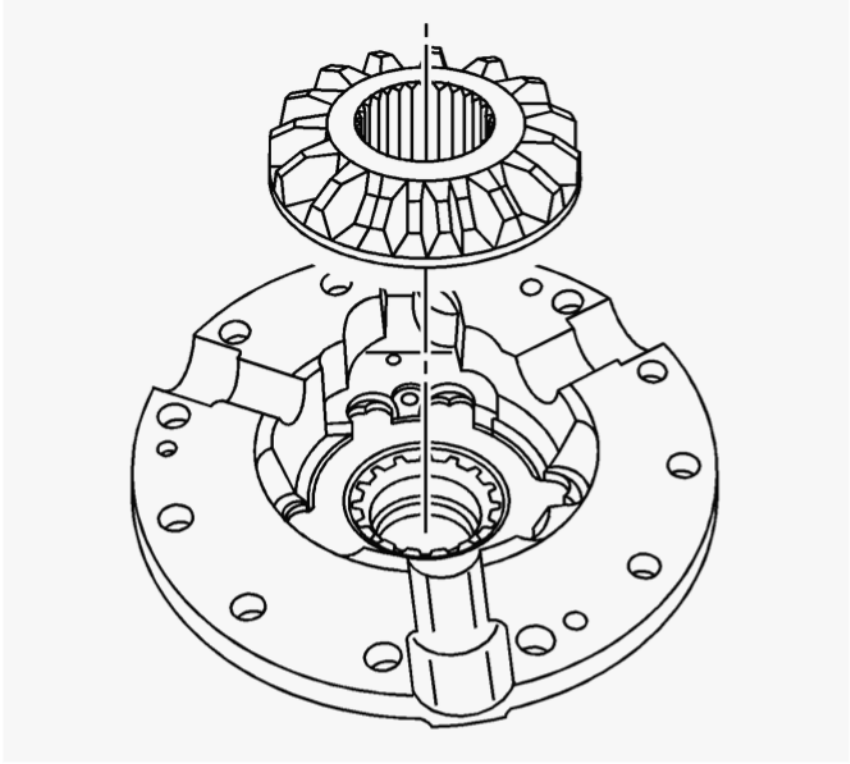


Fig. 318: Locking Differential Side Gear
Courtesy of GENERAL MOTORS COMPANY

3. Install the differential side gear.
4. Assemble a set of washers, a nut, and a bolt long enough in order to hold the side gear in place.

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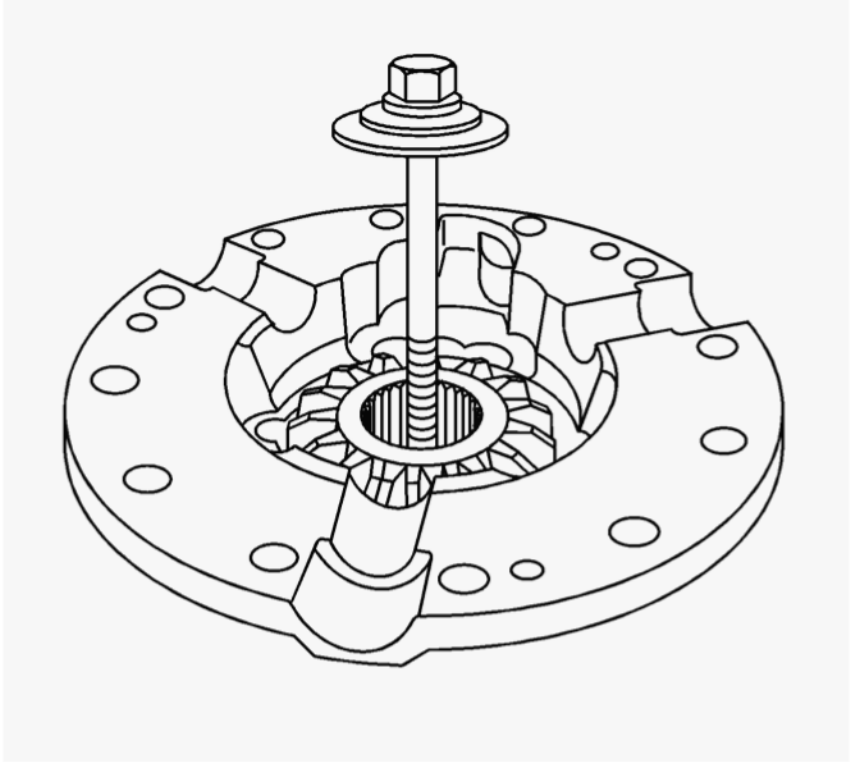


Fig. 319: Bolt And Washer Assembly Through Differential Case Half
Courtesy of GENERAL MOTORS COMPANY

5. Install the bolt and washer assembly through the differential case half.
6. Install a second set of washers and the nut onto the bolt extending through the differential case half.
7. Install the differential case half into a vise.
8. Clamp on the nut on the bottom of the differential case.
9. Tighten the bolt until the clutch plates are compressed.

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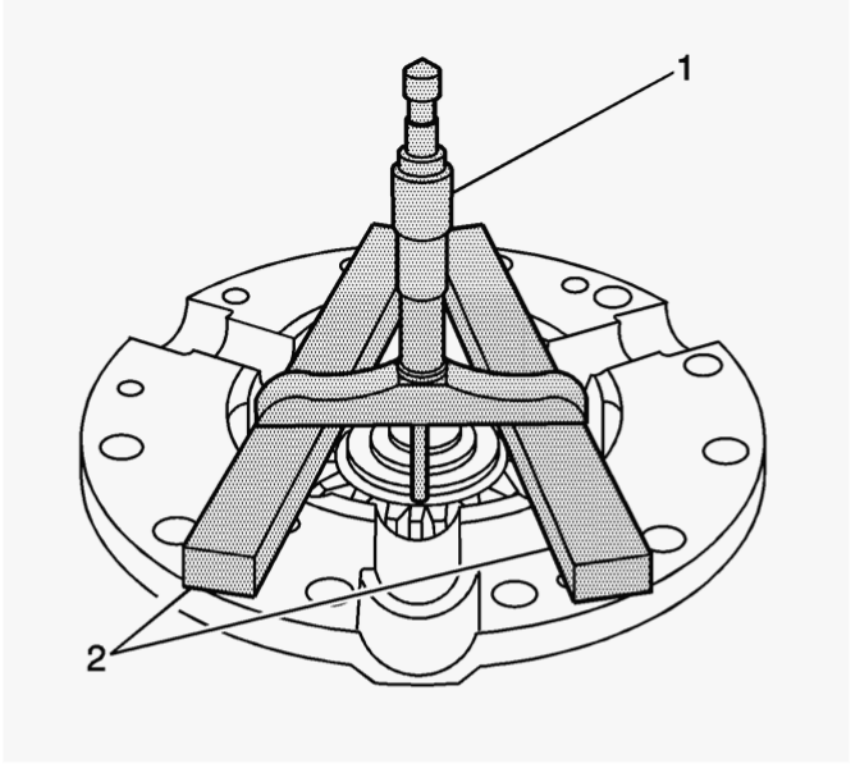


Fig. 320: Magnetic Base Indicator And Flat Gauge Bar Tools
Courtesy of GENERAL MOTORS COMPANY

NOTE: **You will need two of the J 34673 to perform the following service procedure.**

10. Install the **J-34673** bar, **J-34672** micrometer (2) and the **J-34672** micrometer (1) onto the differential case as shown.
11. Install the **J-34673** bar onto the face of the differential case, not the ridge of the differential case, or an inaccurate measurement will result.
12. Measure the depth from the face of the **J-34673** bar to the face of the differential side gear using the **J-34672** micrometer.

    Record the measurement.

13. Measure the thickness of the **J-34673** bar.
14. Subtract the thickness of the **J-34673** bar from the measurement obtained in step 10.
15. Record the measurement. This measurement is equal to one-half of the thrust block thickness.
16. Remove both of the **J-34673** bar from the differential case.
17. Remove the differential case half from the vise.

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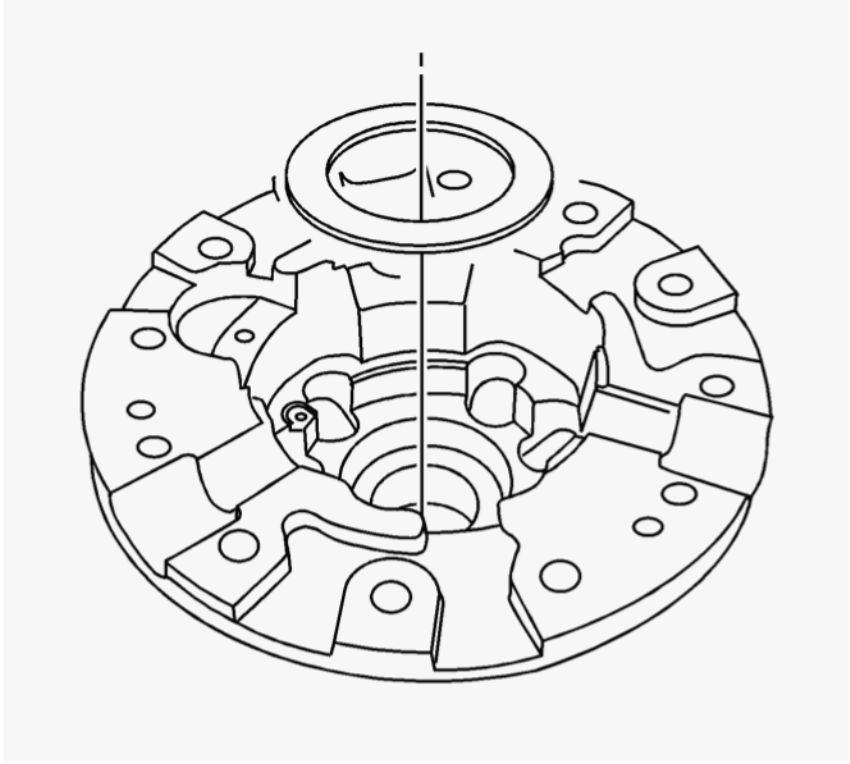


Fig. 321: Right Side Locking Differential Clutch Disc Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

18. Install the locking differential clutch disc thrust washer.

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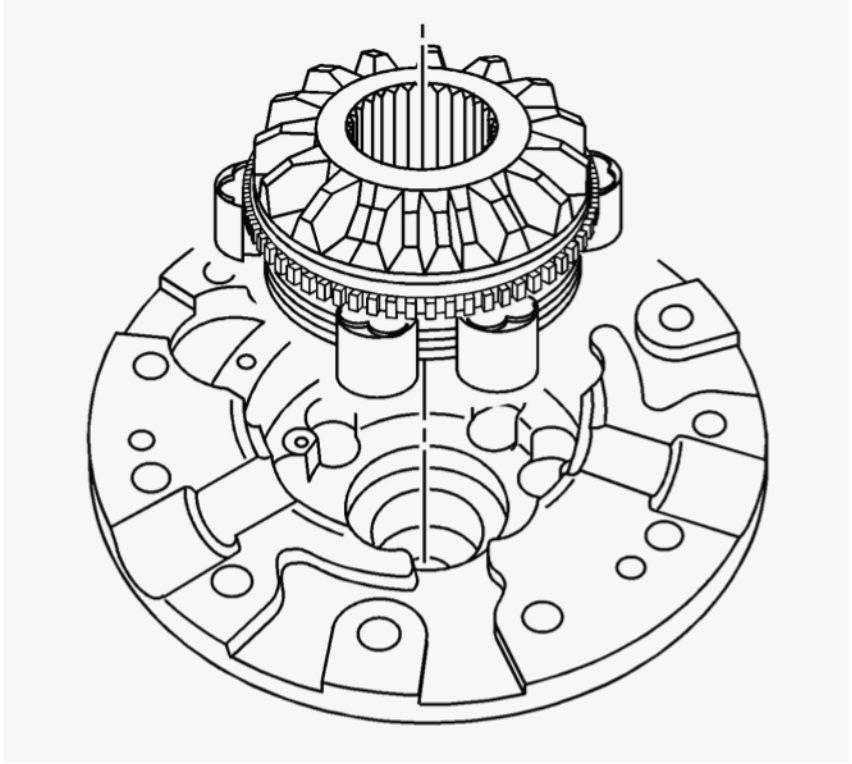


Fig. 322: Right Side Cam Unit And Clutch Plate Assembly
Courtesy of GENERAL MOTORS COMPANY

19. Install the differential side gear cam unit and clutch pack assembly.
20. Assemble a set of washers, a nut, and a bolt long enough in order to hold the side gear in place.

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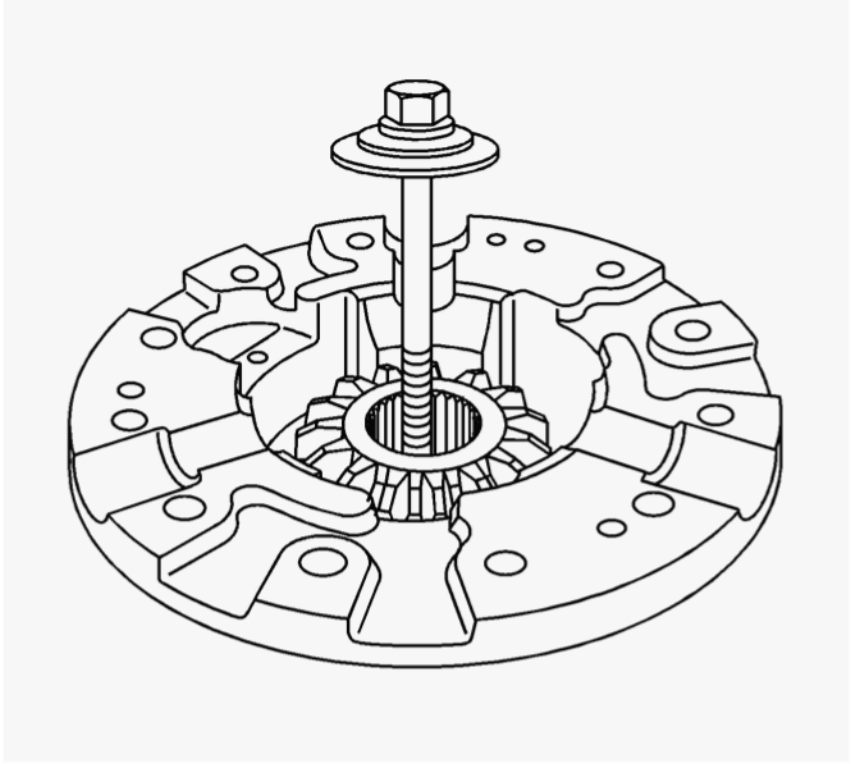


Fig. 323: Bolt And Washer Assembly Through Differential Case Half
Courtesy of GENERAL MOTORS COMPANY

21. Install the bolt and washer assembly through the differential case half.
22. Install a second set of washers and the nut onto the bolt extending through the differential case half.
23. Install the differential case half into a vise.
24. Clamp on the nut on the bottom of the differential case.
25. Tighten the bolt until the clutch plates are compressed.

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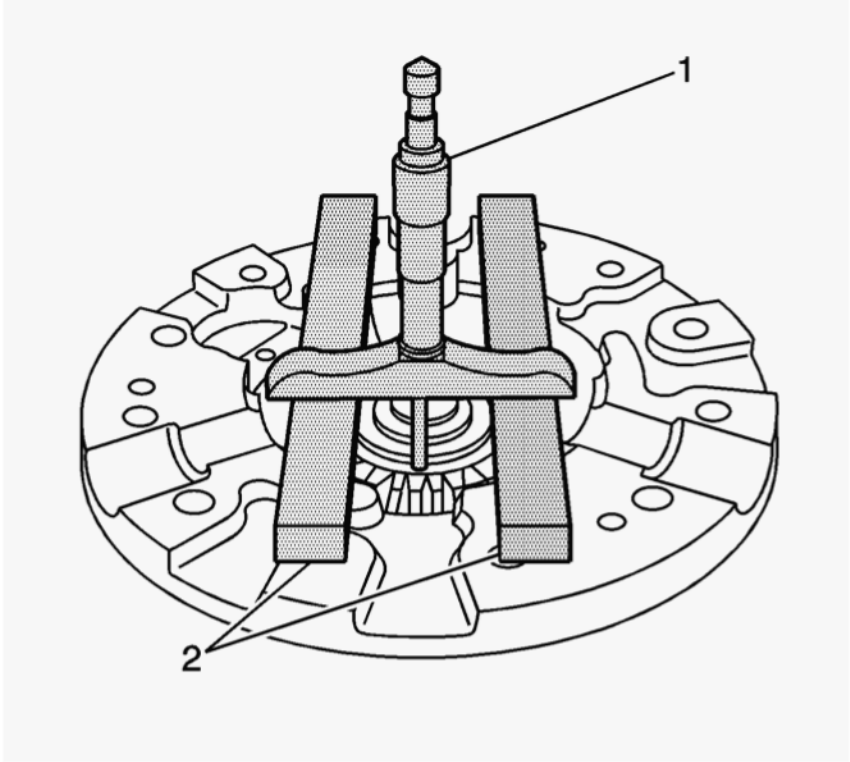


Fig. 324: Installing Special Tools Onto Differential Case
Courtesy of GENERAL MOTORS COMPANY

26. Install the **J-34673** bar (2) and the **J-34672** micrometer (1) onto the differential case.
27. Measure the depth from the face of the **J-34673** bar to the face of the differential side gear using the **J-34672** micrometer. Record the measurement.
28. Measure the thickness of the **J-34673** bar.
29. Subtract the thickness of the **J-34673** bar from the measurement obtained in step 23.
30. Record the measurement. This measurement is equal to one-half of the thrust block thickness.
31. Add the measurements in step 12 and step 25 together. This is the thickness for the thrust block.
32. Compare the measurement obtain in step 25 to the thrust block sizes available. If the measurement is equal to one of the thrust block sizes available, the select that thrust block.
33. If the measurement obtained in step 25 is not equal to one of the thrust block sizes available, then select the thrust block that is smaller the measurement. For example, if the measurement is 40.919 mm (1.611 in), select the 40.894 mm (1.610 in) thrust block.

NOTE: **The backlash must be rechecked and adjusted to specification anytime the left and/or the right thrust washers are replaced.**

34. If the measurement obtained in step 25 is less then 40.488 mm (1.594 in), then reduce the left differential side gear shim or the right locking differential clutch disc thrust washer thickness in order to increase the thrust block opening.
35. If the measurement obtained in step 25 is greater then 41.120 mm (1.622 in), then increase the left differential side gear shim or the right locking differential clutch disc thrust washer thickness in order to decrease the thrust block opening.
36. Recheck the left and/or right side gear backlash and adjust as necessary.
37. Recheck the thrust block clearance and adjust as necessary.

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LOCKING DIFFERENTIAL ASSEMBLE (8.6/9.5/9.76 INCH AXLES)

NOTE: **The left and right side gear backlash and thrust block thickness measurements must be completed before the components of the locking differential can be assembled.**

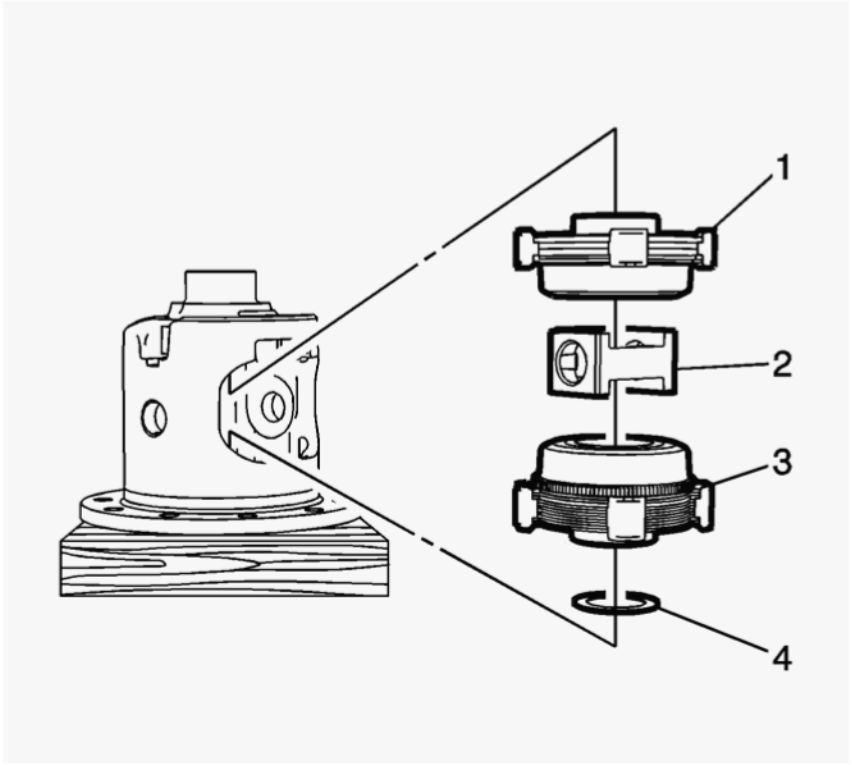


Fig. 325: Right Clutch Pack And Thrust Block
Courtesy of GENERAL MOTORS COMPANY

1. Install the washer (4).
2. Install the left differential locking clutch disc pack and side gear (3).
3. Install the right differential locking clutch disc pack and side gear (2).
4. While holding the right differential locking clutch disc pack and side gear (2), install the differential thrust block (2).

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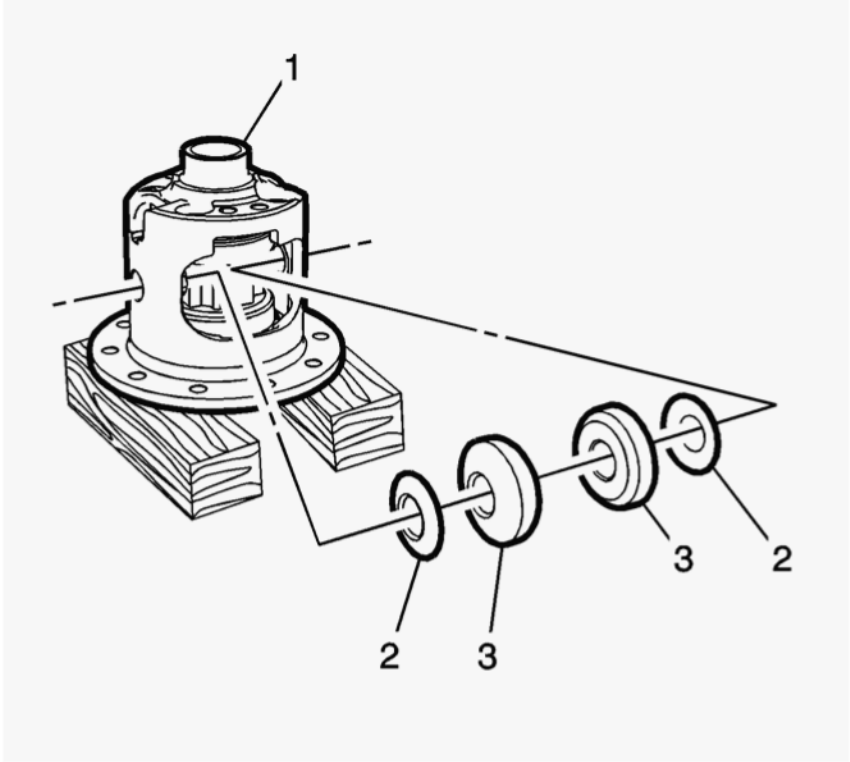


Fig. 326: Differential Side Gears And Thrust Washers
Courtesy of GENERAL MOTORS COMPANY

5. Install the differential pinion gears (3) and thrust washers (2) by rotating the differential pinion gears.

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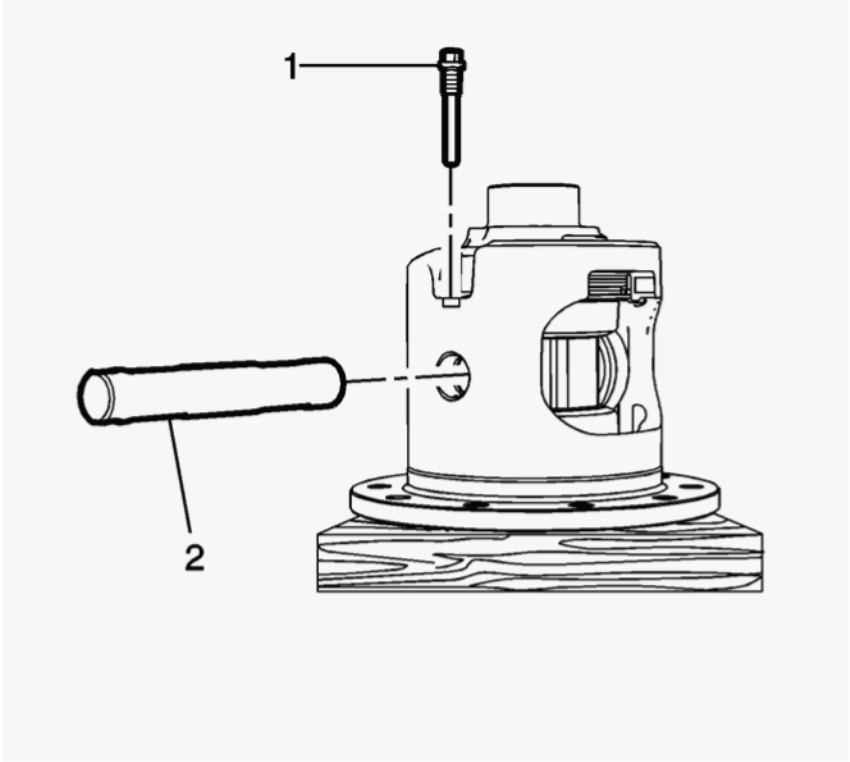


Fig. 327: Differential Pinion Gear Shaft And Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Install the differential pinion gear shaft (2).
7. Install the differential pinion gear shaft bolt (1) and tighten to:
   - For the 8.6 inch axle, tighten to 36 N.m (27 lb ft)
   - For the 9.5/9.76 inch LD axle, tighten to 50 N.m (37 lb ft)

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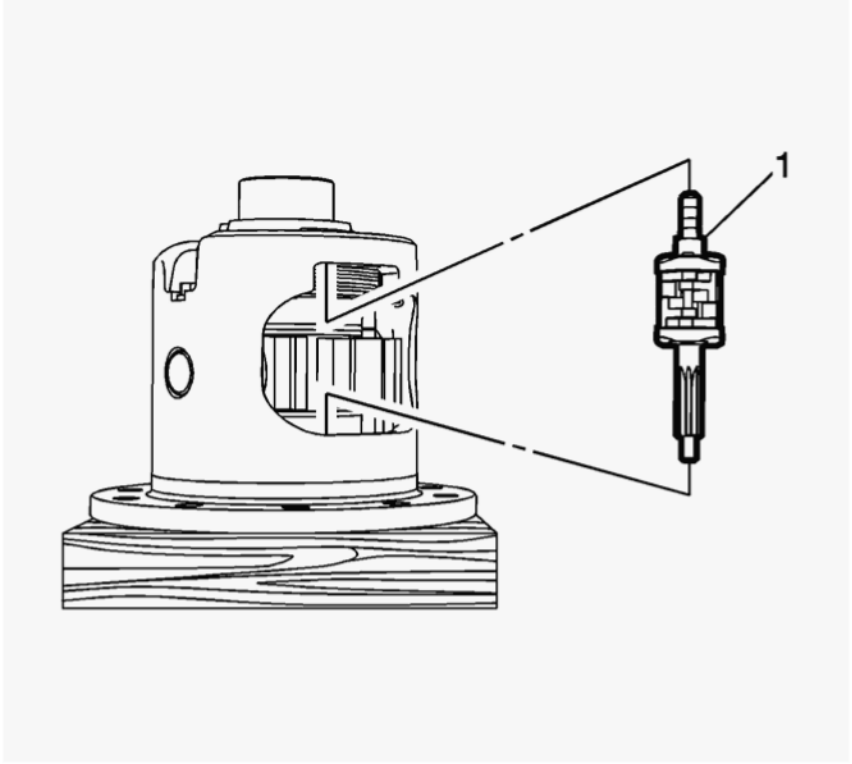


Fig. 328: Locking Differential Governor
Courtesy of GENERAL MOTORS COMPANY

8. Install the locking differential governor (1).

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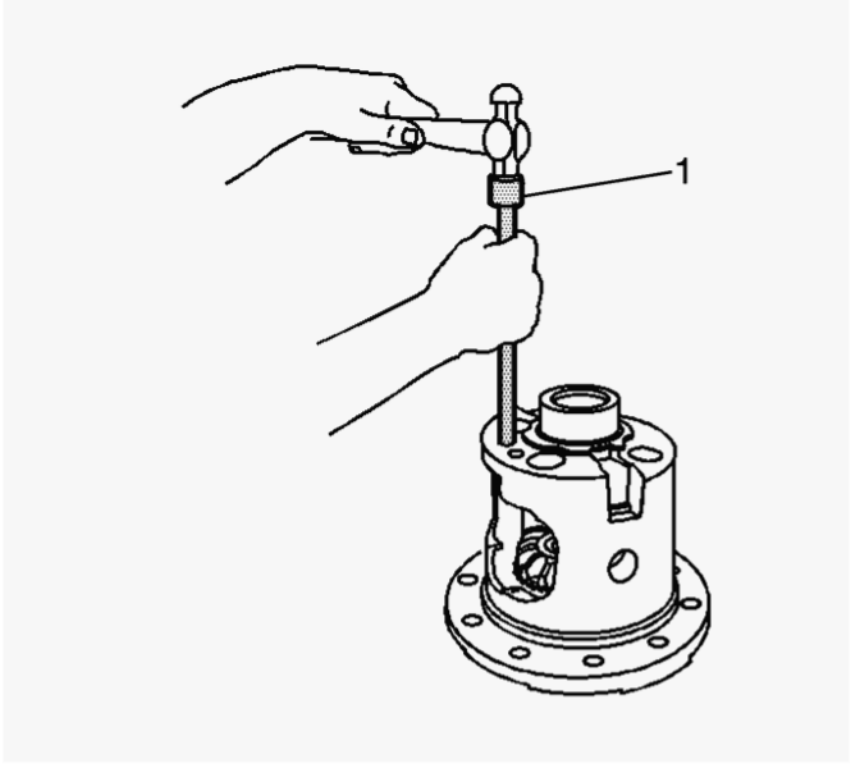


Fig. 329: Installing Governor Bushing
Courtesy of GENERAL MOTORS COMPANY

9. Using a hammer and a punch (1), install the governor bushing until the shaft end play is 0.25-1.27 mm (0.010-0.050 in).

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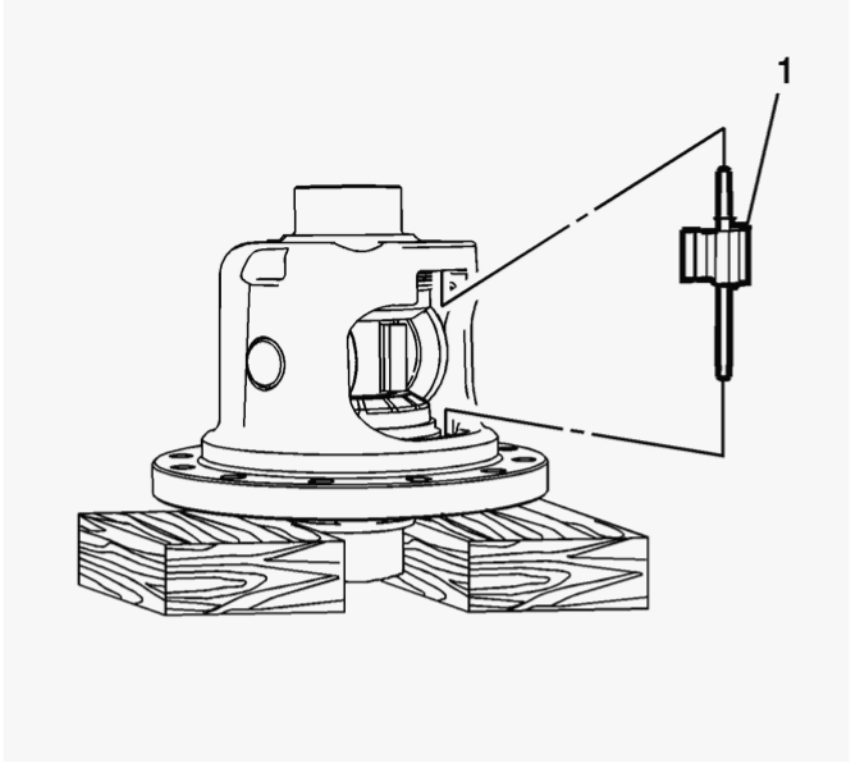


Fig. 330: Locking Differential Latching Bracket
Courtesy of GENERAL MOTORS COMPANY

NOTE: **The straight end of the latching bracket spring must be over and outside the governor assembly shaft.**

10. Install the locking differential latching bracket (1).

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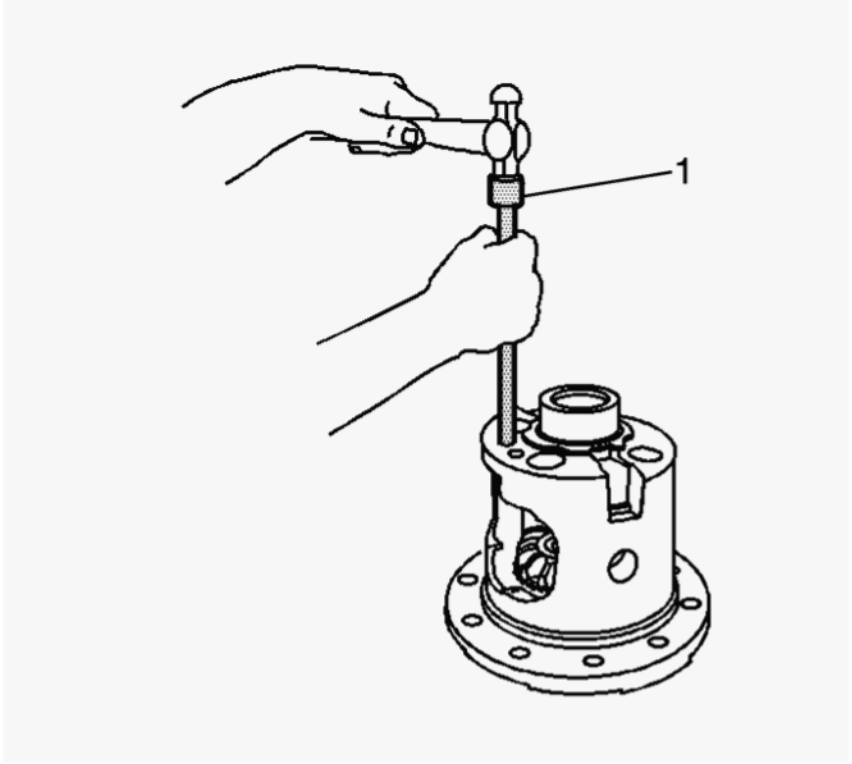


Fig. 331: Installing Governor Bushing
Courtesy of GENERAL MOTORS COMPANY

11. Using a hammer and a punch (1), install the governor bushing until the shaft end play is 0.000-0.051 mm (0.000-0.002 in).
12. Install the ring gear, if necessary. Refer to **Drive Pinion and Ring Gear Replacement (8.6/9.5/9.76 Inch Axle)**

LOCKING DIFFERENTIAL ASSEMBLE (10.5 INCH AXLE)

NOTE: **The left and right side gear backlash and thrust block thickness measurement must be completed before the components of the differential can be assembled.**

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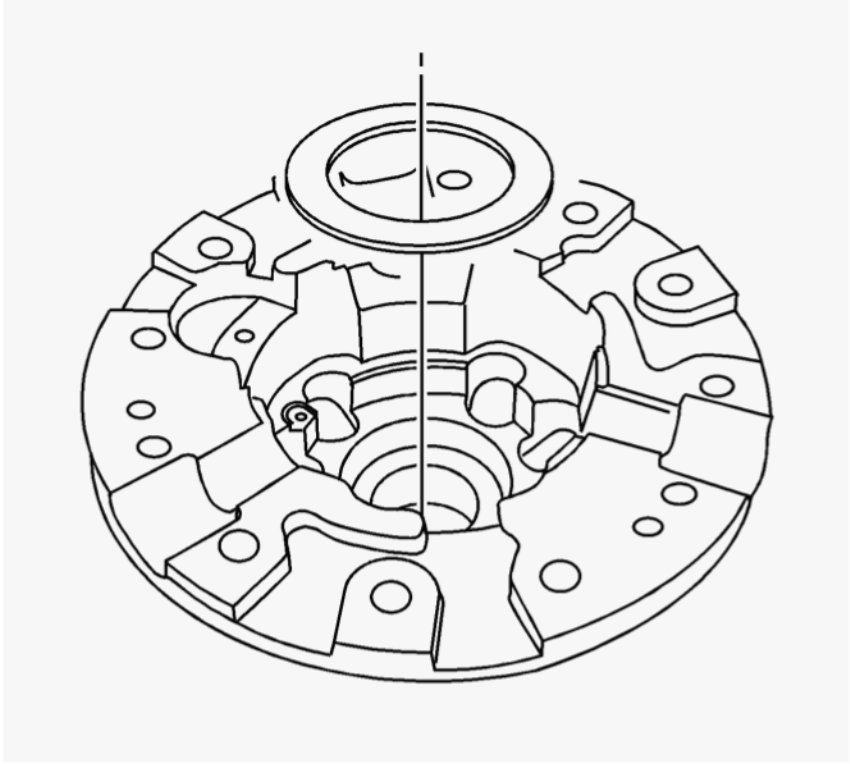


Fig. 332: Right Side Locking Differential Clutch Disc Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

1. Install the right side differential side gear shim into the right differential case half.

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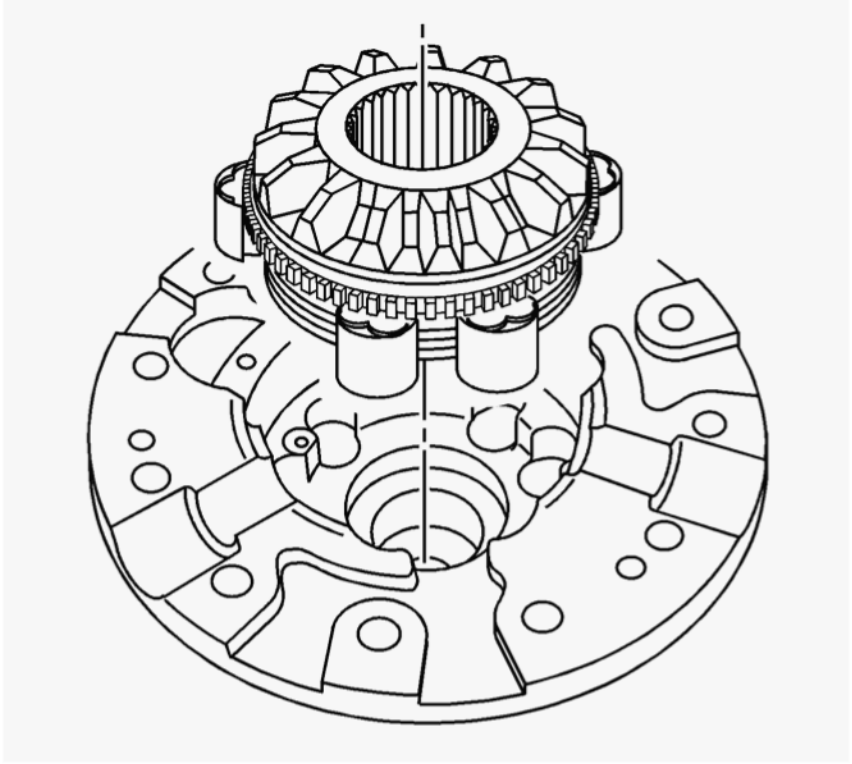


Fig. 333: Right Side Cam Unit And Clutch Plate Assembly
Courtesy of GENERAL MOTORS COMPANY

2. Install the locking differential side gear cam unit and clutch disc assembly.

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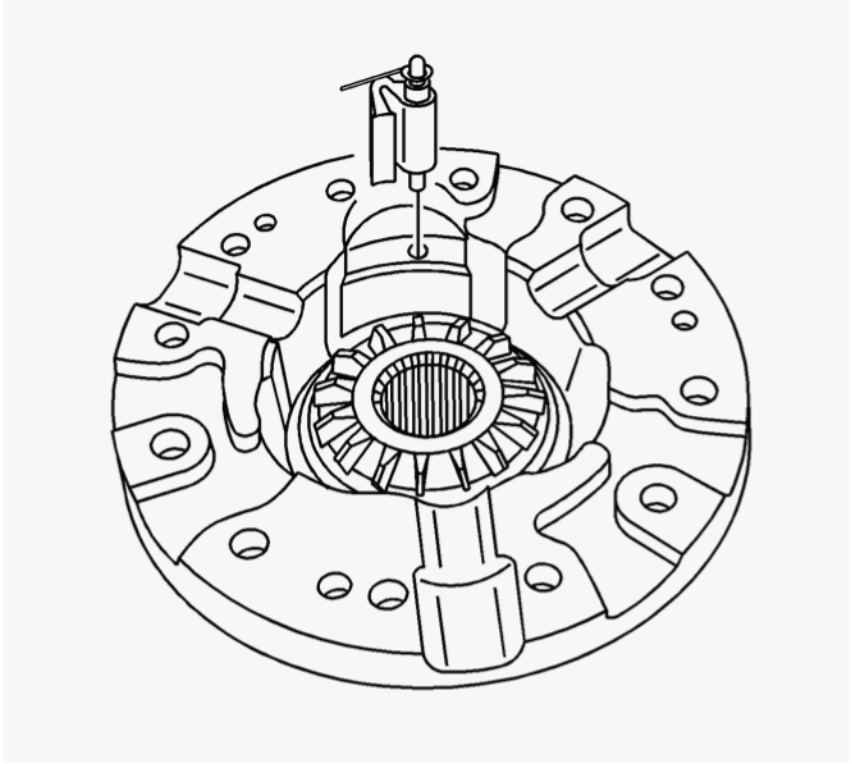


Fig. 334: Latching Bracket And Spring Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Install the latching bracket and spring assembly.

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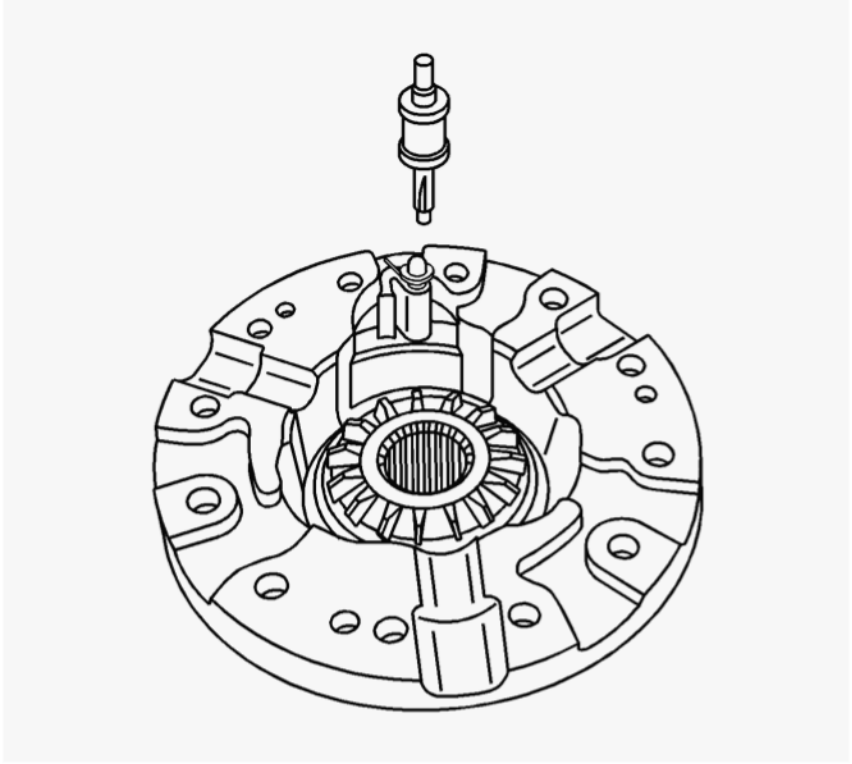


Fig. 335: Governor Assembly
Courtesy of GENERAL MOTORS COMPANY

4. Install the governor assembly.

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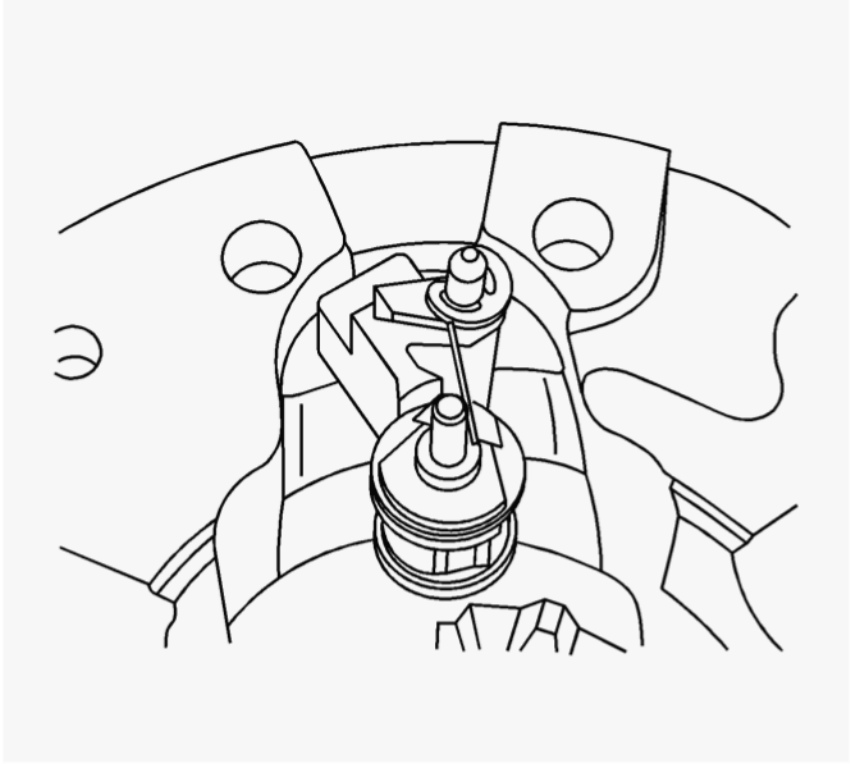


Fig. 336: Latching Bracket Spring And Governor Assembly Shaft
Courtesy of GENERAL MOTORS COMPANY

5. Position the straight end of the latching bracket spring over the governor assembly shaft.

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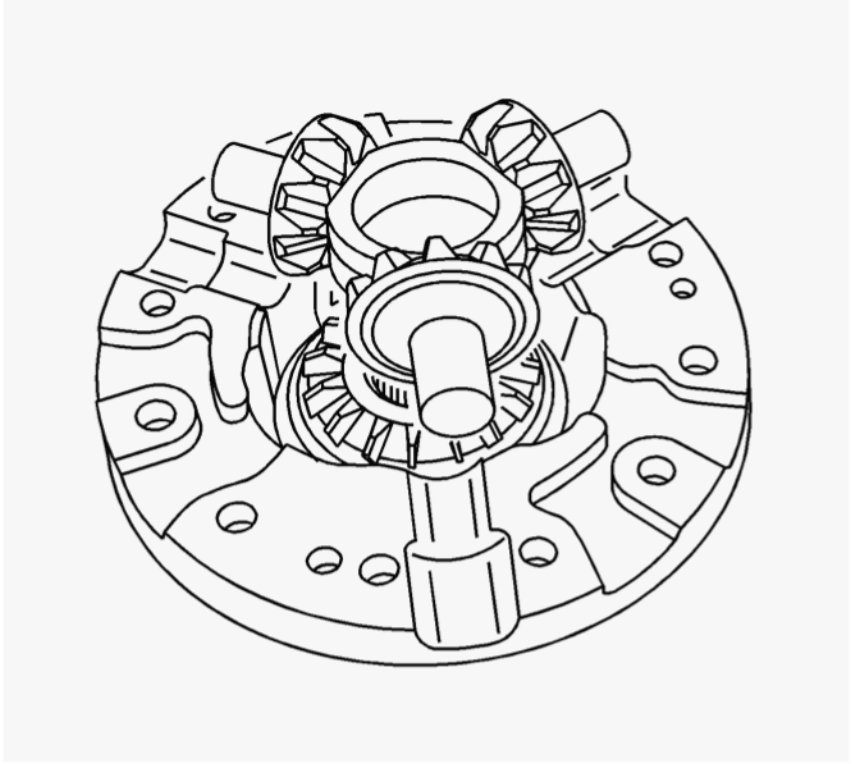


Fig. 337: Locking Differential Spider, Differential Pinion Gears & Thrust Washers
Courtesy of GENERAL MOTORS COMPANY

6. Install the locking differential spider, the differential pinion gears, and the differential pinion gear thrust washers into the differential case.

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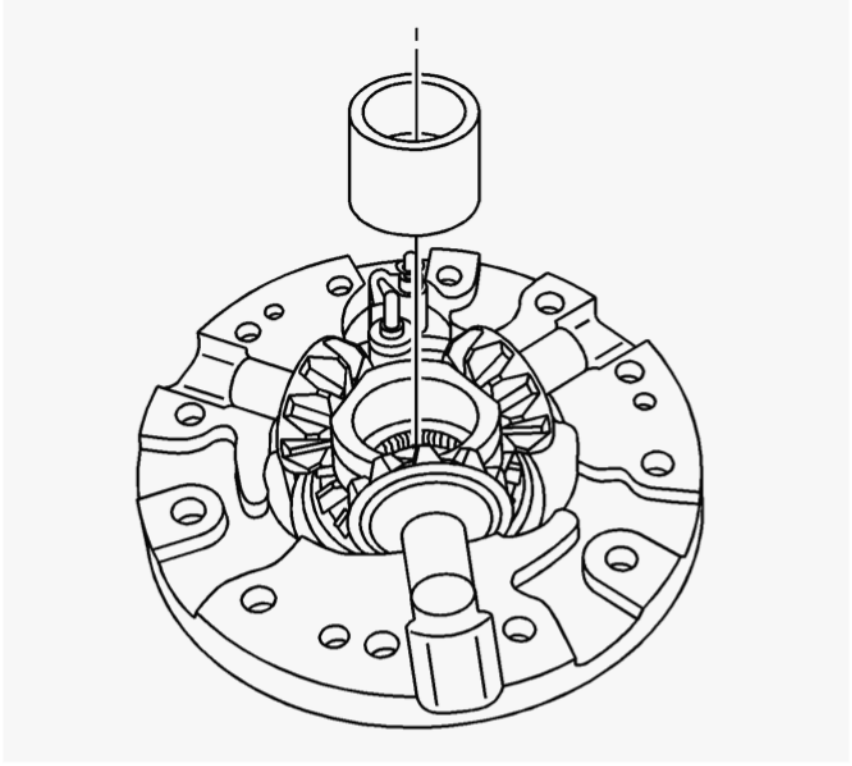


Fig. 338: Thrust Block
Courtesy of GENERAL MOTORS COMPANY

7. Install the thrust block.

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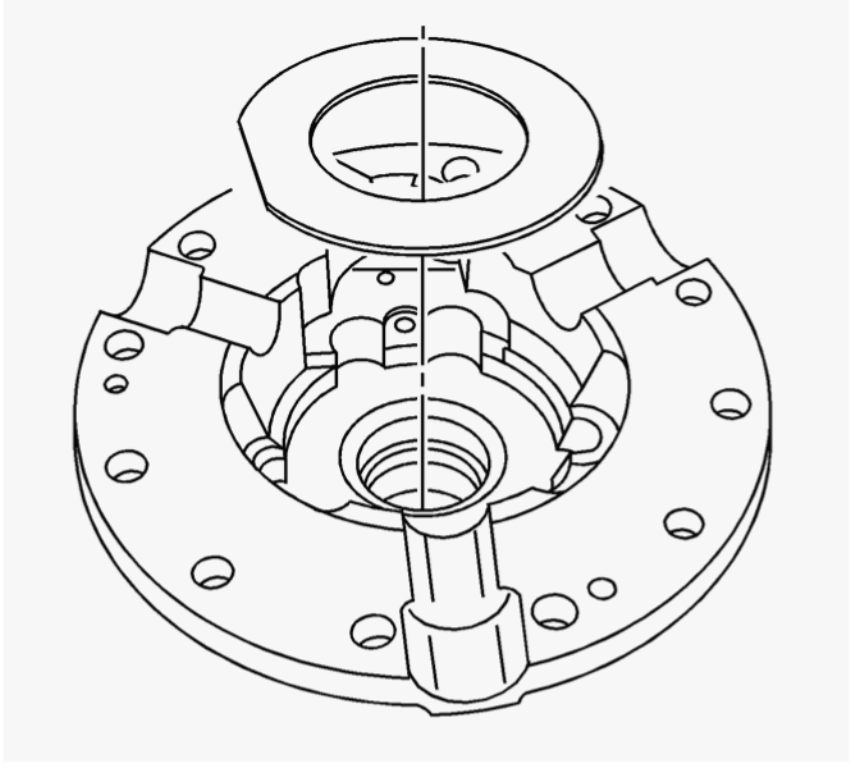


Fig. 339: Left Side Gear Thrust Washer
Courtesy of GENERAL MOTORS COMPANY

8. Install the left side differential side gear shim into the left differential case half.

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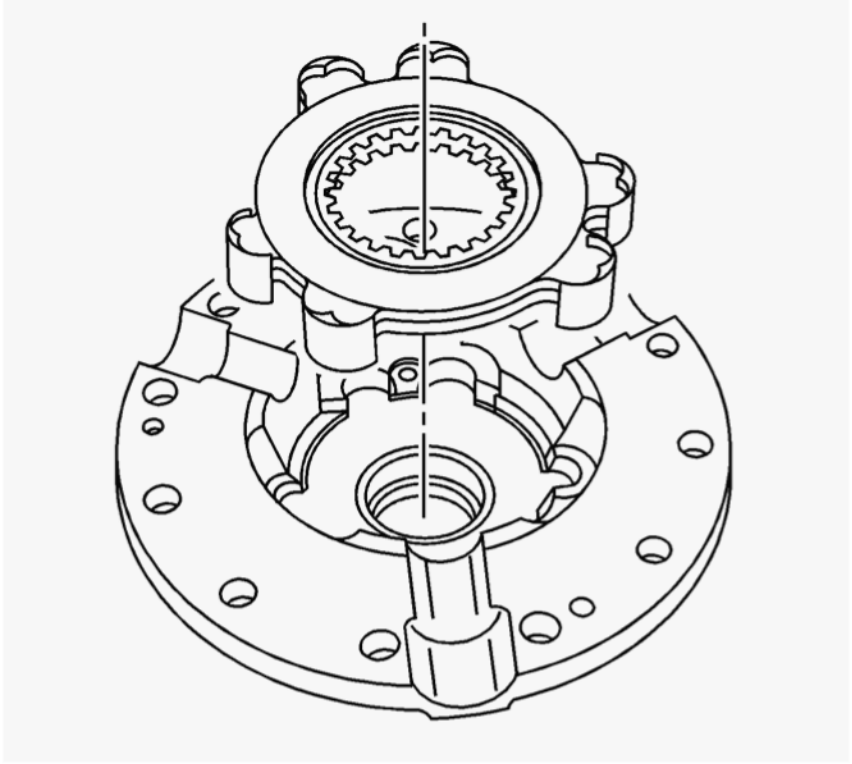


Fig. 340: Left Side Clutch Plates And Guide Clips
Courtesy of GENERAL MOTORS COMPANY

9. Install the left side clutch disc assembly.

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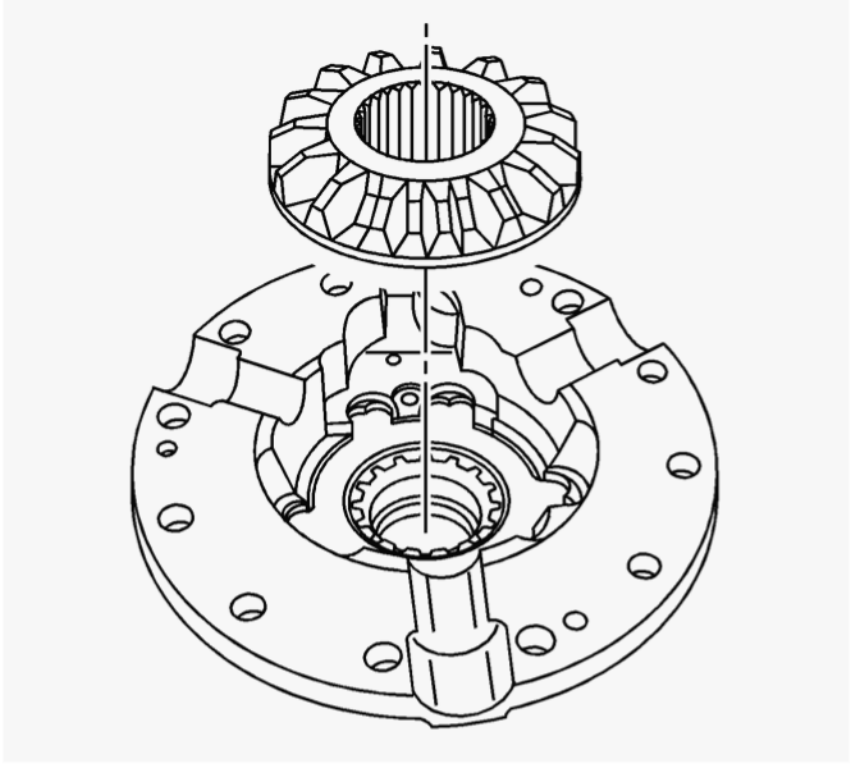


Fig. 341: Locking Differential Side Gear
Courtesy of GENERAL MOTORS COMPANY

10. Install the locking differential side gear.

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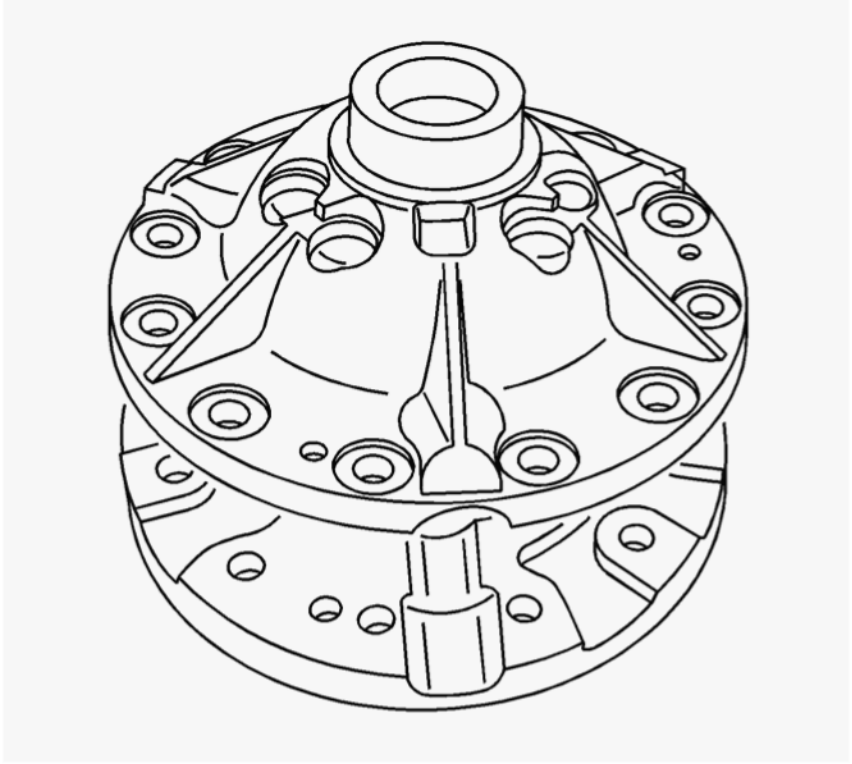


Fig. 342: Left Case Half And Right Case Half
Courtesy of GENERAL MOTORS COMPANY

11. Install the left case half to the right case half.

    Hold the left side locking differential side gear and clutch disc assembly in the left side case half.

    Align the governor and latching bracket assembly shaft with the holes in the left case half.

12. Turn the differential case over onto the left case half.

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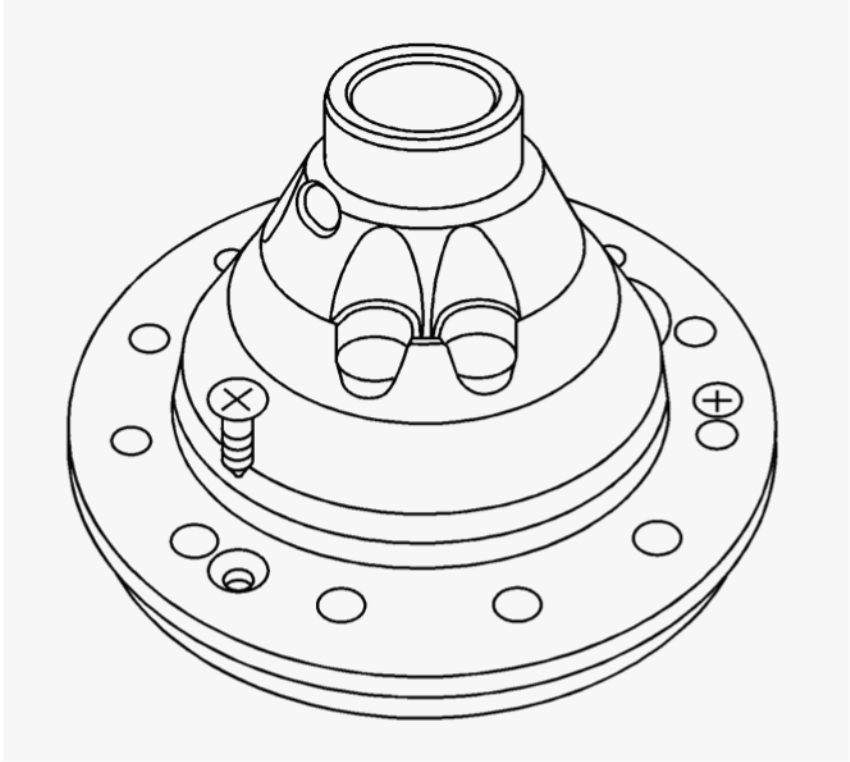


Fig. 343: Differential Case Screws
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

13. Install the differential case screws.

    Tighten

    Tighten the differential case screws to 17 N.m (13 lb ft).

14. Install the ring gear. Refer to **Drive Pinion and Ring Gear Replacement (10.5 Inch Axle)**.
15. Install the differential side bearings. Refer to **Differential Bearing Replacement**.

DESCRIPTION AND OPERATION

DIFFERENTIAL DRIVE PINION GEAR AND RING GEAR DESCRIPTION AND OPERATION

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 will produce a square pattern from the toe to the heel of the (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 the toe to the heel and from the top to the bottom. For the proper gear tooth wear pattern, refer to **Gear Tooth Contact Pattern Inspection**.

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Test Procedure

1. Using the appropriate cleaning solvent, remove the lubricant from the differential housing and from the teeth of the ring gear.

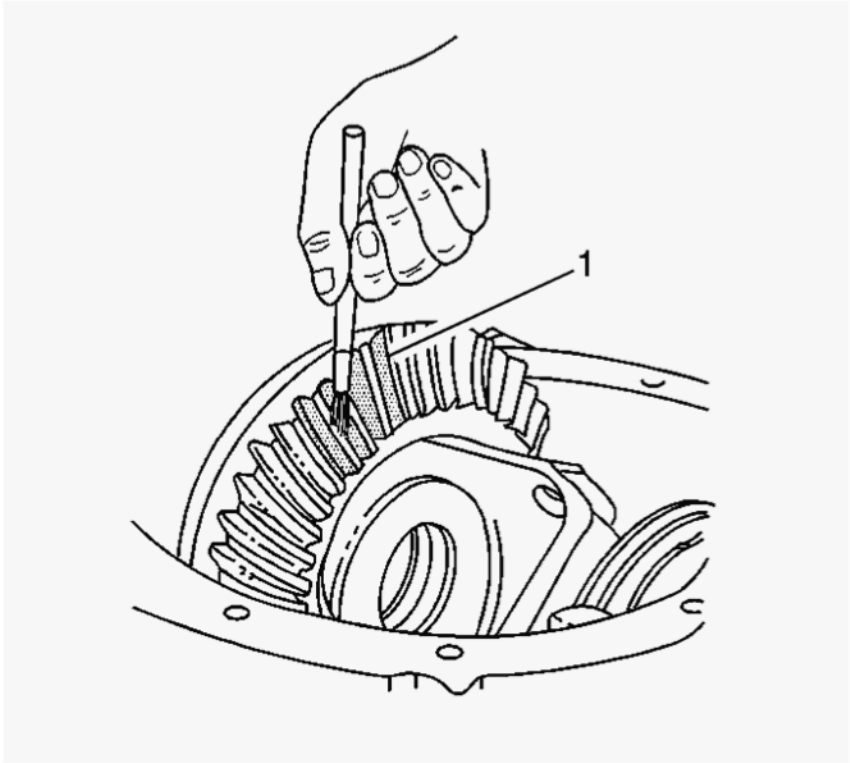


Fig. 344: Applying Gear Marking Compound To Ring Gear Teeth
Courtesy of GENERAL MOTORS COMPANY

2. Using a medium stiff brush, sparingly apply gear marking compound to all of the ring gear teeth. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

CAUTION: **Refer to Fastener Caution .**

3. Torque the differential bearing caps.
   - Tighten the differential bearing caps. For the 8.6 inch axle, tighten the bearing caps to 75 N.m (55 lb ft)
   - For the 9.5/9.76 inch axles, tighten the bearing caps to 95 N.m (63 lb ft)
4. Apply the park brake until the torque load is 14 N.m (10 lb ft) is required to rotate the pinion.

NOTE: **Avoid rotating the ring gear excessively, this could give a false contact pattern.**

5. Using the appropriate size wrench, slowly rotate the drive pinion flange/yoke 3 complete revolutions clockwise.
6. Slowly rotate the drive pinion flange/yoke 3 complete revolutions counter-clockwise.
7. Observe the contact pattern on the teeth. Refer to **Gear Tooth Contact Pattern Inspection**.

LOCKING DIFFERENTIAL DESCRIPTION AND OPERATION

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The locking differential consists of the following components:

- Differential case - 1 or 2 piece
- Locking differential spider - 2 piece case only
- Pinion gear shaft - 1 piece case only
- Differential pinion gear shaft lock bolt - 1 piece case only
- Two clutch discs sets
- Locking differential side gear
- Thrust block
- Locking differential clutch disc guides
- Differential side gear shim
- Locking differential clutch disc thrust washer
- Locking differential governor
- Latching bracket
- Cam plate assembly
- Differential pinion gears
- Differential pinion gear thrust washers

The optional locking differential (RPO G80) enhances the traction capability of the rear axle by combining the characteristics of a limited-slip differential and the ability of the axle shafts to "lock" together when uneven traction surfaces exist. The differential accomplishes this in 2 ways. First by having a series of clutch plates at each side of the differential case to limit the amount of slippage between each wheel. Second, by using a mechanical locking mechanism to stop the rotation of the right differential side gear, in order to transfer the rotating torque of the wheel without traction to the wheel with traction. Each of these functions occur under different conditions.

Limited-Slip Function

Under normal conditions, when the differential is not locked, a small amount of limited-slip action occurs. The gear separating force developed in the right-hand clutch pack is primarily responsible for this.

The operation of how the limited-slip function of the unit works can be explained when the vehicle makes a right-hand turn. Since the left wheel travels farther than the right wheel, it must rotate faster than the ring gear and differential case assembly. This results in the left axle and left side gear rotating faster than the differential case. The faster rotation of the left-side gear causes the pinion gears to rotate on the pinion shaft. This causes the right-side gear to rotate slower than the differential case.

Although the side gear spreading force produced by the pinion gears compresses the clutch packs, primarily the right side, the friction between the tires and the road surface is sufficient to overcome the friction of the clutch packs. This prevents the side gears from being held to the differential case.

Locking Function

Locking action occurs through the use of some special parts:

- A governor mechanism with 2 flyweights
- A latching bracket
- The left side cam plate and cam side gear

When the wheel-to-wheel speed difference is 100 RPM or more, the flyweights of the governor will fling out and one of them will contact an edge of the latching bracket. This happens because the left cam side gear and cam plate are rotating at a speed different, either slower or faster, than that of the ring gear and differential case assembly. The cam plate has teeth on its outer diameter surface in mesh with teeth on the shaft of the governor.

As the side gear rotates at a speed different than that of the differential case, the shaft of the governor rotates with enough speed to force the flyweights outward against spring tension. One of the flyweights catches its edge on the closest edge of the latching bracket, which is stationary in the differential case. This latching process triggers a chain of events.

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When the governor latches, it stops rotating. A small friction clutch inside the governor allows rotation, with resistance, of the governor shaft while one flyweight is held to the differential case through the latching bracket. The purpose of the governor's latching action is to slow the rotation of the cam plate as compared to the cam side gear. This will cause the cam plate to move out of its detent position.

The cam plate normally is held in its detent position by a small wave spring and detent humps resting in matching notches of the cam side gear. At this point, the ramps of the cam plate ride up on the ramps of the cam side gear, and the cam plate compresses the left clutch pack with a self-energizing action.

As the left clutch pack is compressed, it pushes the cam plate and cam side gear slightly toward the right side of the differential case. This movement of the cam side gear pushes the thrust block which compresses the right-hand side gear clutch pack.

At this point, the force of the self-energizing clutches and the side gear separating force combine to hold the side gears to the differential case in the locking stage.

The entire locking process occurs in less than 1 second. The process works with either the left or right wheel spinning, due to the design of the governor and cam mechanism. A torque reversal of any kind will unlatch the governor, causing the cam plate to ride back down to its detent position. Cornering or deceleration during a transmission shift will cause a torque reversal of this type. The differential unit returns to its limited-slip function.

The self-energizing process would not occur if it were not for the action of one of the left clutch discs. This energizing disc provides the holding force of the ramping action to occur. It is the only disc which is splined to the cam plate itself. The other splined discs fit on the cam side gear.

If the rotating speed of the ring gear and differential case assembly is high enough, the latching bracket will pivot due to centrifugal force. This will move the flyweights so that no locking is permitted. During vehicle driving, this happens at approximately 32 km/h (20 mph) and continues at faster speeds.

When comparing the effectiveness of the locking differential, in terms of percent-of-grade capability to open and limited-slip units, the locking differential has nearly 3 times the potential of the limited-slip unit under the same conditions.

Locking Differential Torque-Limiting Disc

The locking differential design was modified in mid-1986 to include a load-limiting feature to reduce the chance of breaking an axle shaft under abusive driving conditions. The number of tangs on the energizing disc in the left-hand clutch pack was reduced allowing these tangs to shear in the event of a high-torque engagement of the differential locking mechanism.

At the time of failure of the load-limiting disc, there will be a loud bang in the rear axle and the differential will operate as a standard differential with some limited-slip action of the clutch packs at low torques.

The service procedure, when the disc tangs shear, involves replacing the left-hand clutch plates and the wave spring. It is also necessary to examine the axle shafts for twisting because at high torques it is possible to not only shear the load-limiting disc, but to also twist the axle shafts.

REAR DRIVE AXLE DESCRIPTION AND OPERATION

Rear axles for this vehicle consist of the following components:

- Differential axle housing
- Differential carrier
- Right and left axle tubes
- Right and left axle shafts

These axles are either full-floating or semi-floating. These axles can be identified as follows: The semi-floating axle has axle shafts with C-clips inside the differential carrier on the inner ends of the axle shafts. The full-floating axle has bolts at the hub retaining the axle shafts to the hub assembly. The axles can be identified by the stamping on the right side axle tube They may also be identified by the ring gear size. The ring gear sizes include 8.60, 9.50, 10.50 and 11.50 inch axles. The limited slip/locking differential information for these rear axles can be located in the limited slip/locking differential section.

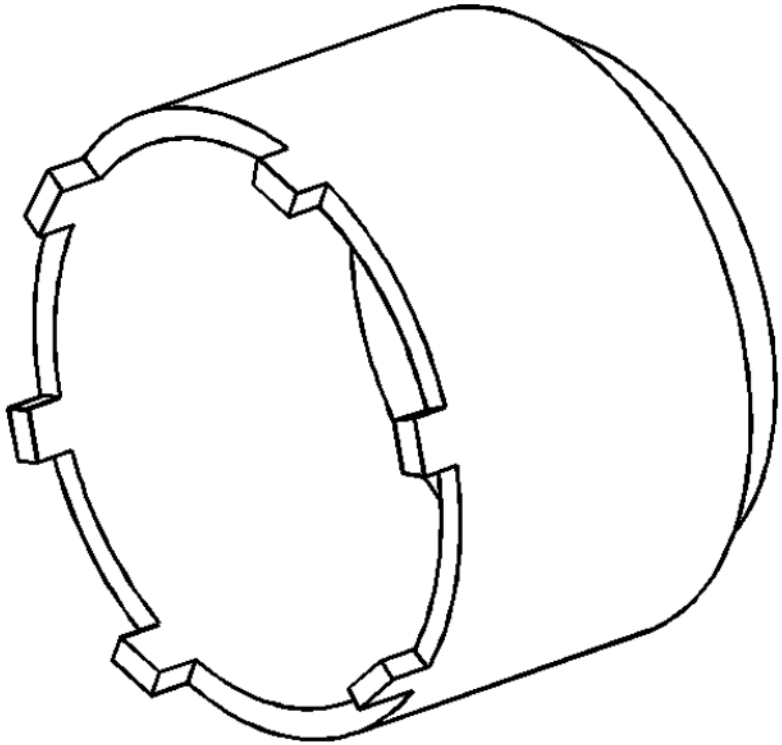
A open differential has a set of four gears. Two are side gears and 2 are pinion gears. Some differentials have more than 2 pinion gears. Each side gear is splined to an axle shaft so each axle shaft ; so each axle shaft turns when it's side gear rotates. The pinion gears are mounted on a differential pinion shaft, and the gears are free to rotate on this shaft. The pinion shaft is fitted into a bore in the differential case and is at right angles to the axle shafts. Power is transmitted through the differential as follows: the drive pinion rotates the ring gear. The ring gear being bolted to the differential case, rotates the case, The differential pinion, as it rotates the case, forces the pinion gears against the side gears. When both wheels have equal traction, the pinion gears do not rotate on the pinion shaft because of input force on the pinion gear is equally divided between the two side gears. Therefore, the pinion gears revolve with the pinion shaft, but do not rotate around the shaft itself. The side gears, being splined to the axle shafts and in mesh with the pinion gears rotate the axle shafts. If a vehicle were always driven in a straight line, the ring and pinion gears would be sufficient. The axle shaft could be solidly attached to the ring gear and both driving wheels

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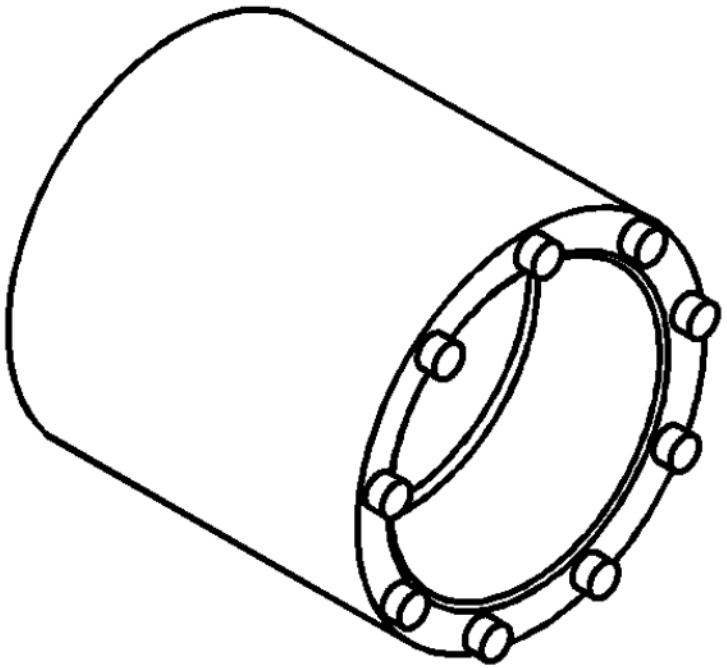
would turn at equal speed. However, if it became necessary to turn a corner, the tires would scuff and slide because the differential allows the axle shafts to rotate at different speeds. When the vehicle turns a corner, the inner wheel turns slower than the out wheel and slows it's rear axle side gear (as the shaft is splined to the side gear). The rear axle pinion gears will roll around the slowed rear axle side gear, driving the rear axle side gear wheel faster.

SPECIAL TOOLS AND EQUIPMENT

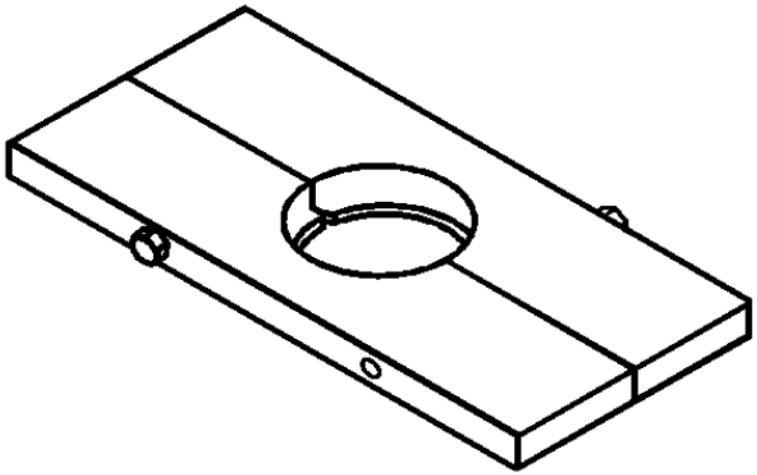
SPECIAL TOOLS

Illustration	Tool Number/Description
	CH 49794 J 2222-C Wheel Bearing Race Installer Outer

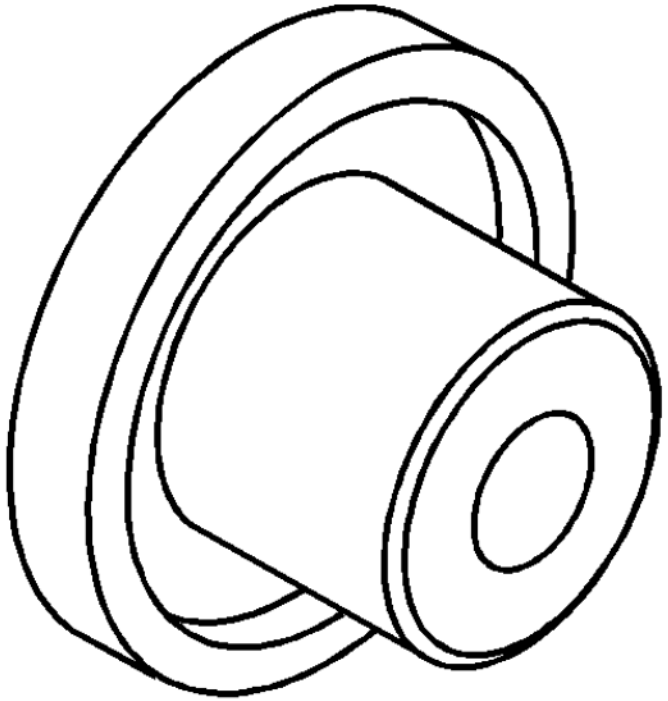
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Illustration	Tool Number/Description
	CH 50636 Wheel Bearing Nut Wrench

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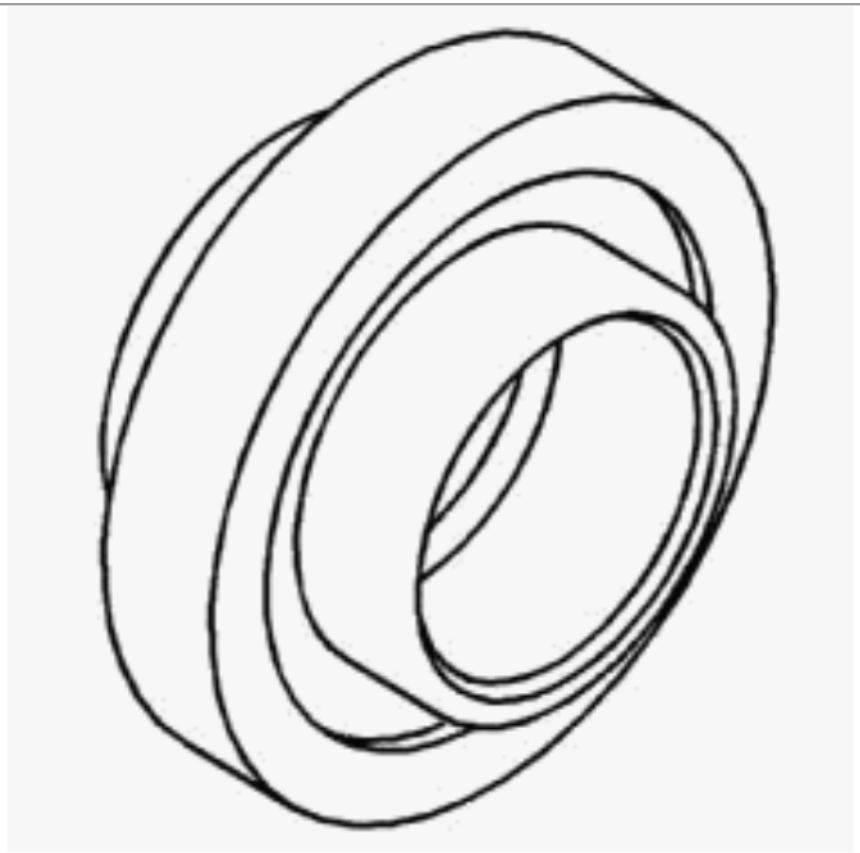
Illustration	Tool Number/Description
	DT 47688 Pinion Bearing Remover

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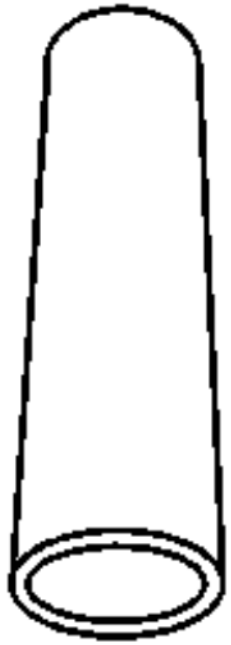
Illustration	Tool Number/Description
	DT 49032 Inner Pinion Bearing Race Installer

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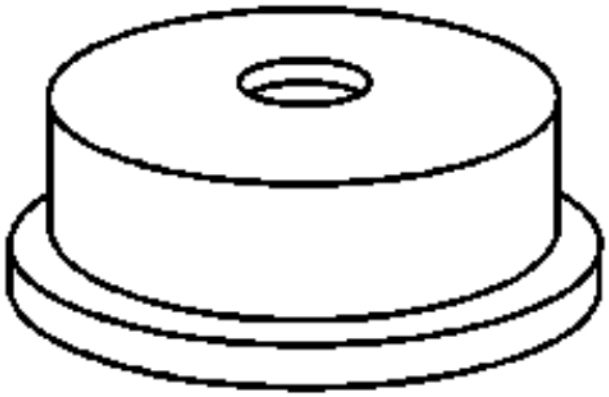
Illustration	Tool Number/Description
	DT 50871 Seal Installer

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Illustration	Tool Number/Description
	J-44412 Pinion Bearing Installer

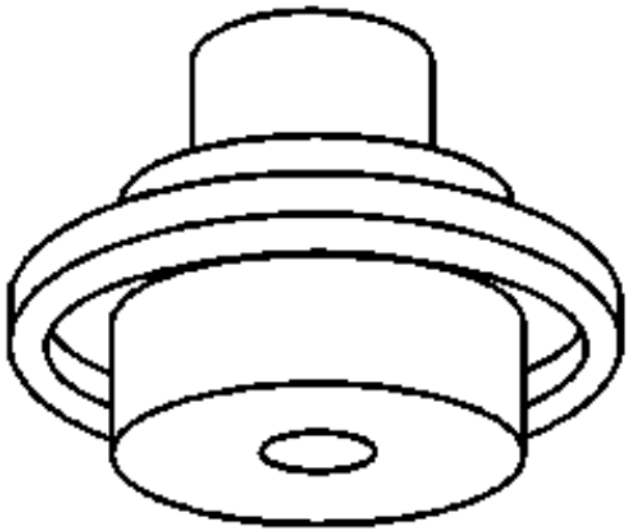
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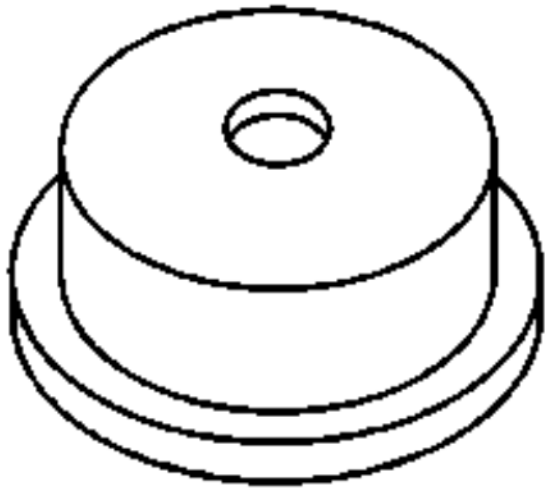
Illustration	Tool Number/Description
	J-44417 Pinion Bearing Race Installer

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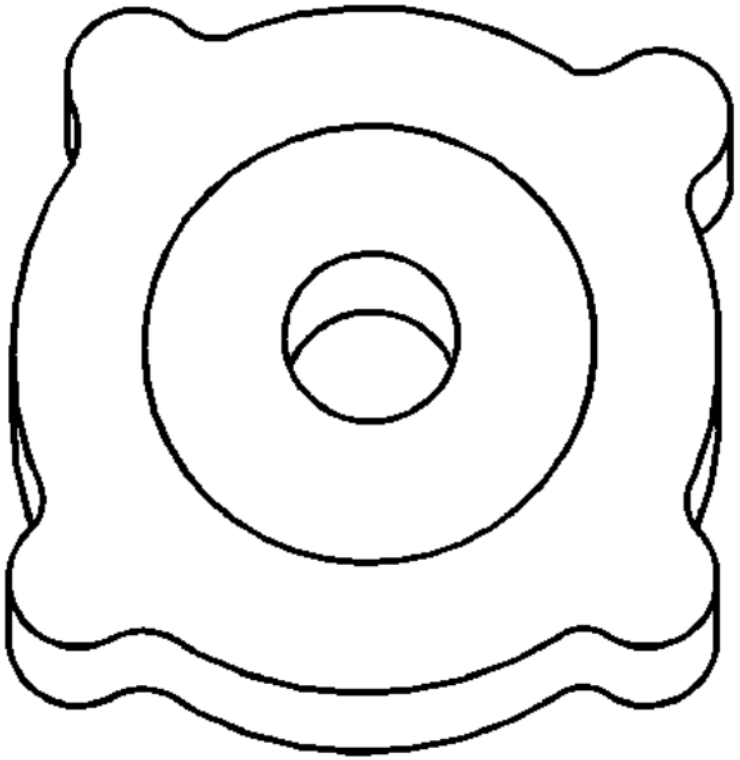
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Illustration	Tool Number/Description
	DT 50289 J 44420 Differential Bearing and Hub Seal Installer

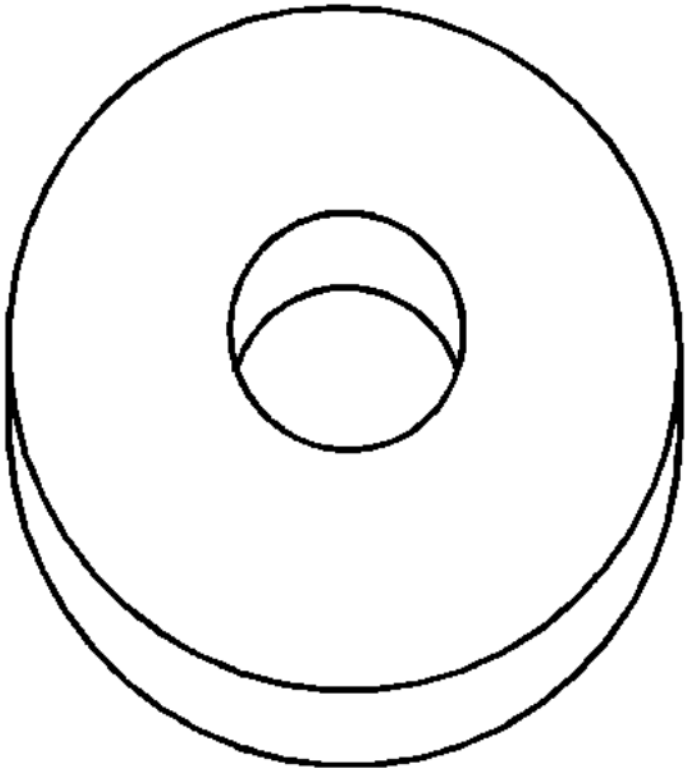
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Illustration	Tool Number/Description
	DT 50290 J 44419 Hub Outer Bearing Race Installer

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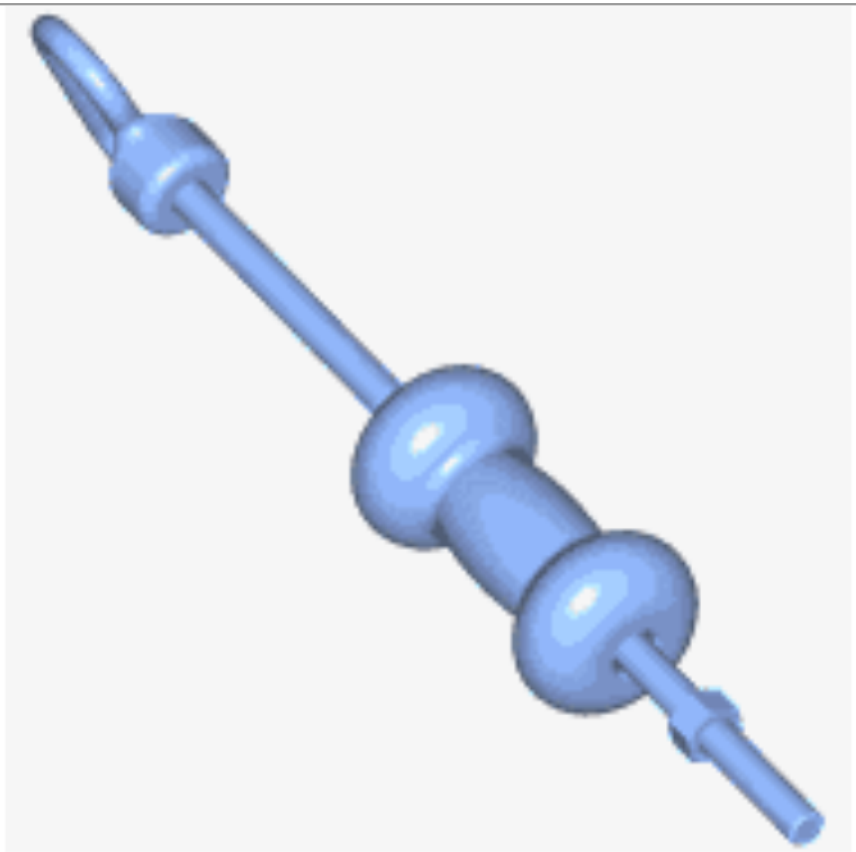
Illustration	Tool Number/Description
	DT 50291 J 24426 Wheel Bearing Race Installer - Outer

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Illustration	Tool Number/Description
	DT 50292 J 24427 Hub Outer Bearing Race Installer

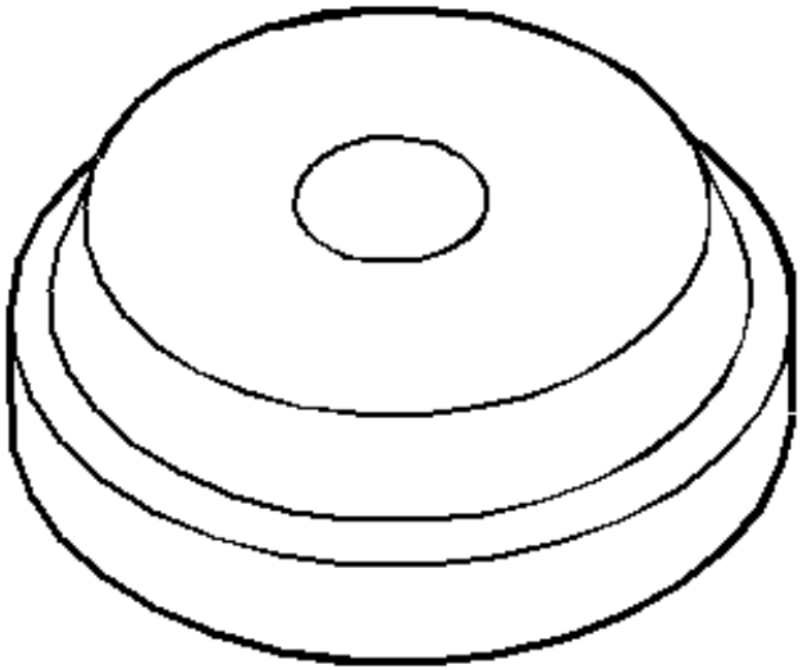
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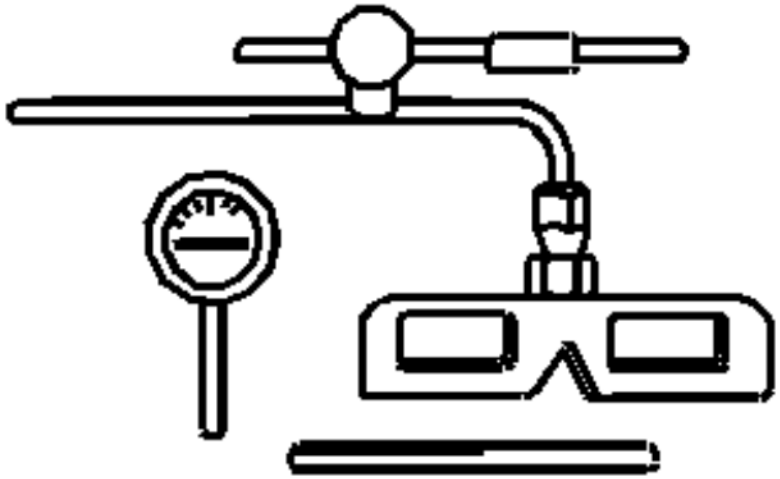
Illustration	Tool Number/Description
	J 2619-01 Slide Hammer

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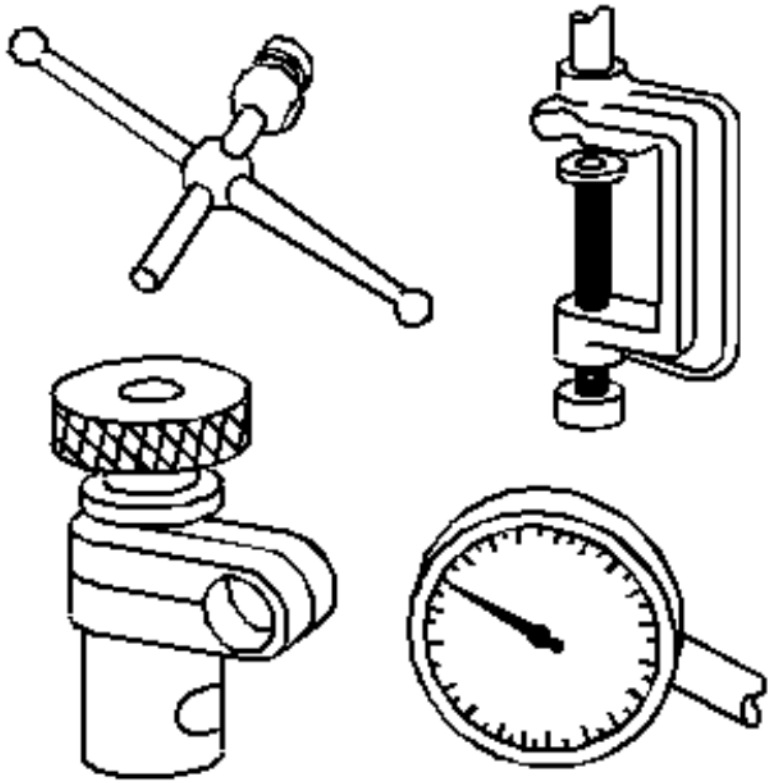
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Illustration	Tool Number/Description
	J 7818 Inner Bearing Race Installer

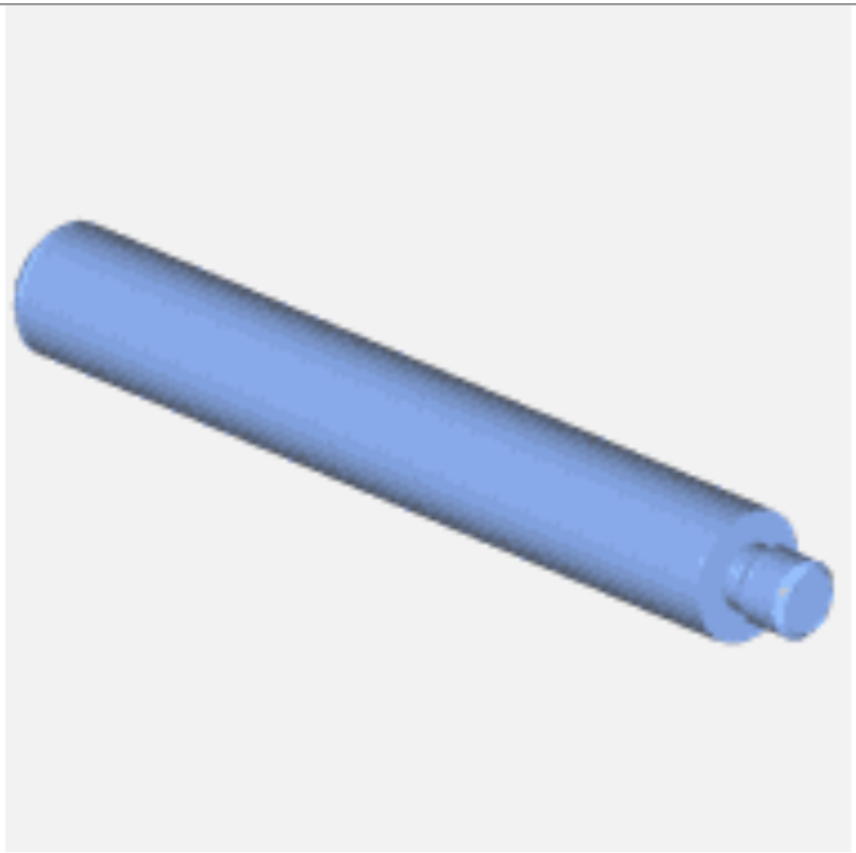
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Illustration	Tool Number/Description
	J 7872 Magnetic Base Dial Indicator

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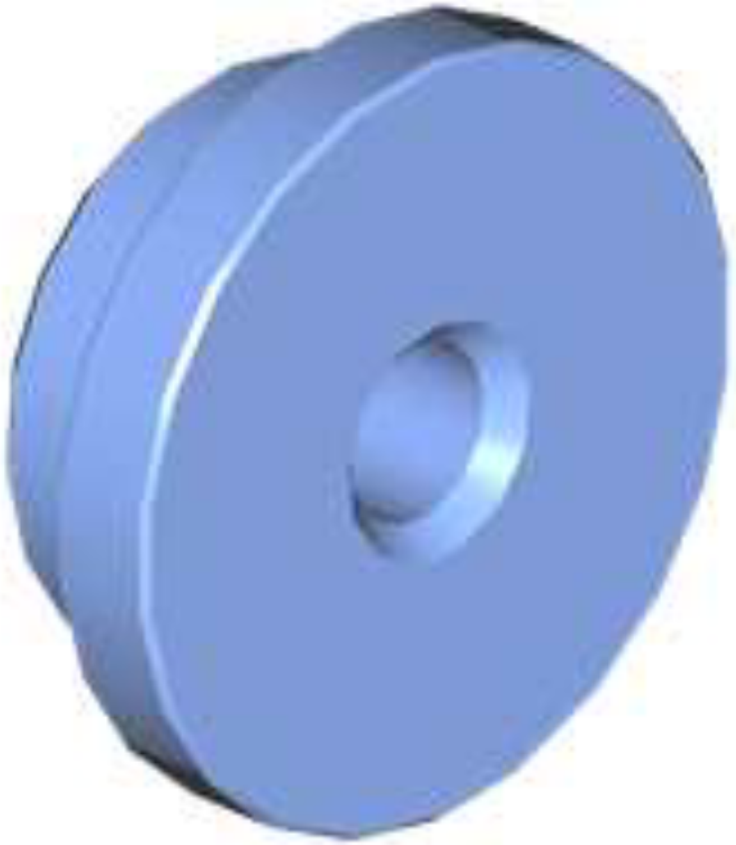
Illustration	Tool Number/Description
	J 8001 Dial Indicator Set

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Illustration	Tool Number/Description
	J 8092 Driver Handle

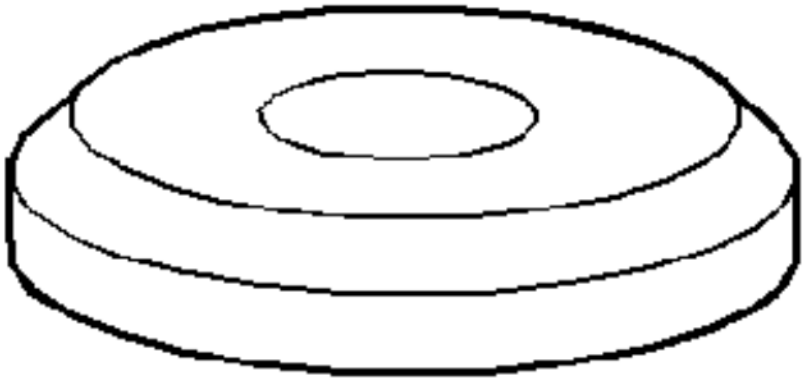
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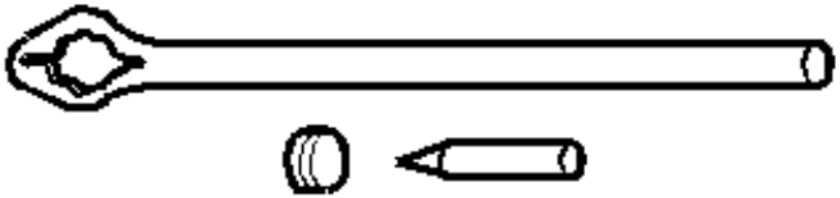
Illustration	Tool Number/Description
	J 8107-4 Side Bearing Puller Pilot

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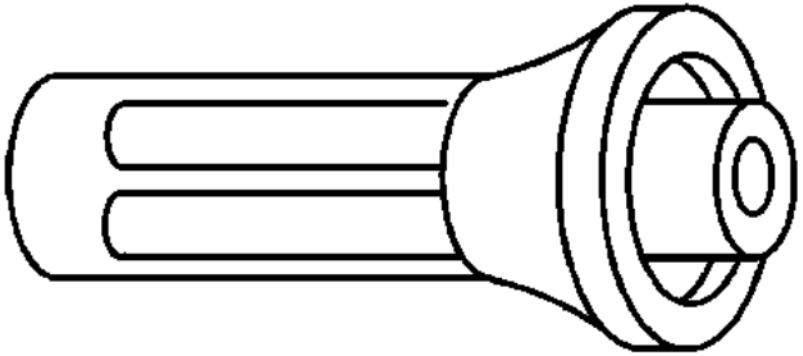
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Illustration	Tool Number/Description
	J 8608 Rear Pinion Bearing Race Installer

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Illustration	Tool Number/Description
	J 8614-01 Flange and Pulley Holding Tool

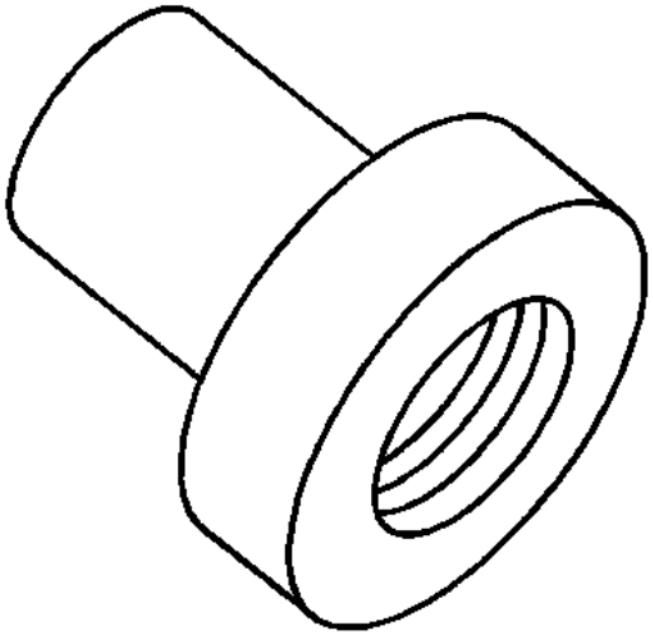
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Illustration	Tool Number/Description
	J 21128 Axle Pinion Oil Seal Installer

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Illustration	Tool Number/Description
	J 21777-B Pinion Setting Gauge Kit

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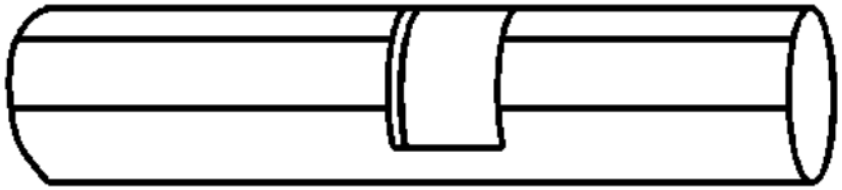
Illustration	Tool Number/Description
	J 21784 Side Bearing Installer

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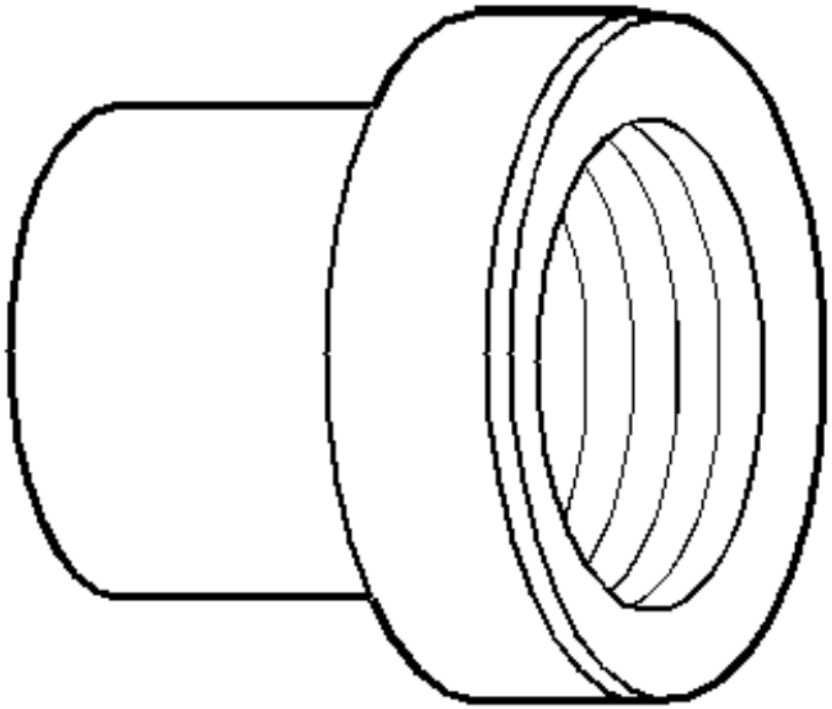
Illustration	Tool Number/Description
	J 22306 Pinion Cup Bearing Installer - Rear

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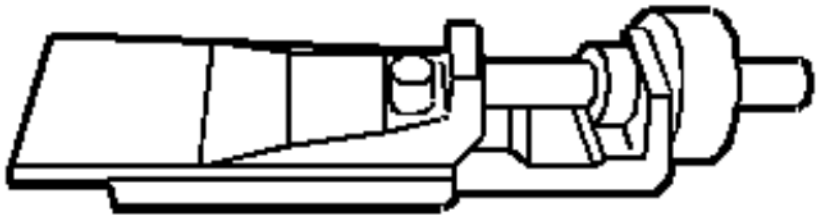
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Illustration	Tool Number/Description
	J 22536 Pinion Driver

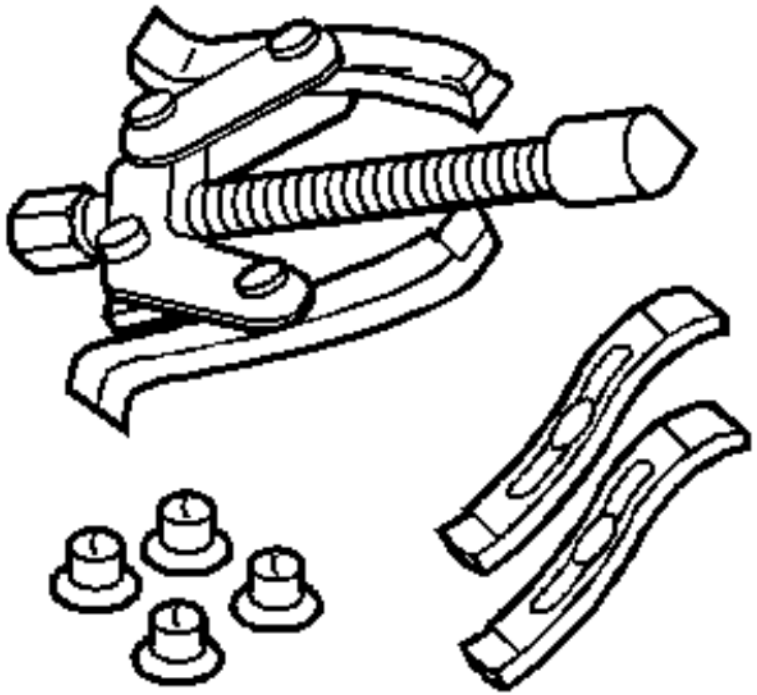
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Illustration	Tool Number/Description
	J 22761 Differential Side Bearing Installer

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Illustration	Tool Number/Description
	J 22779 Side Bearing Backlash Gauge

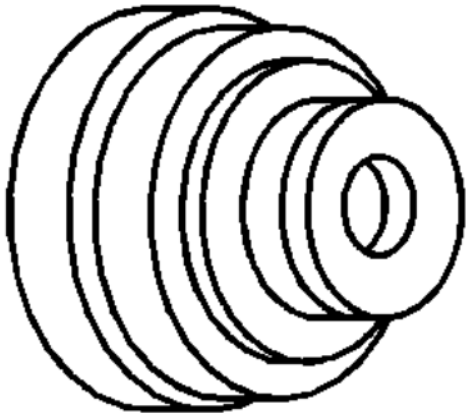
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Illustration	Tool Number/Description
	J 22888-D Side Bearing Remover Kit

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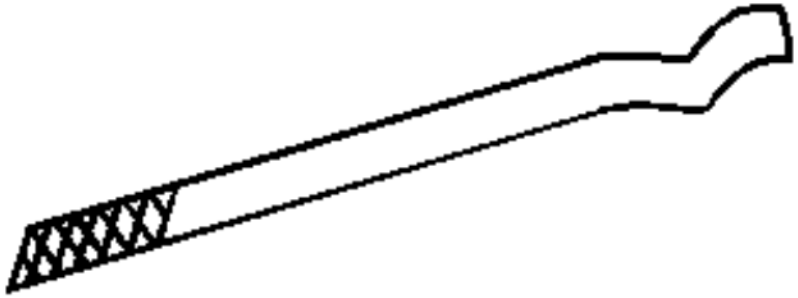
Illustration	Tool Number/Description
	J 22912-B Bearing Puller

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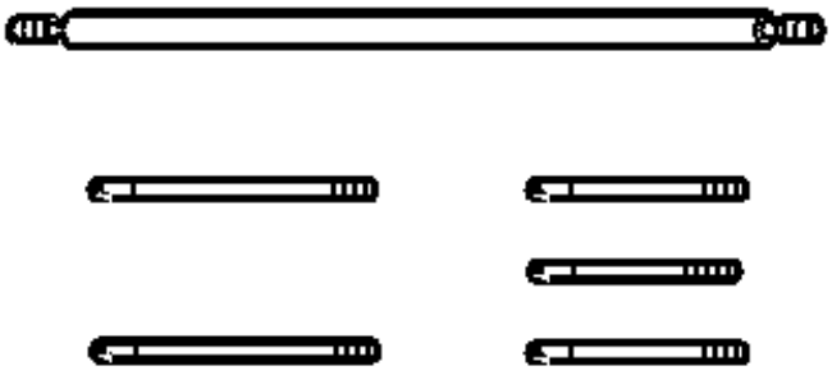
Illustration	Tool Number/Description
	J 23690 Bearing Installer

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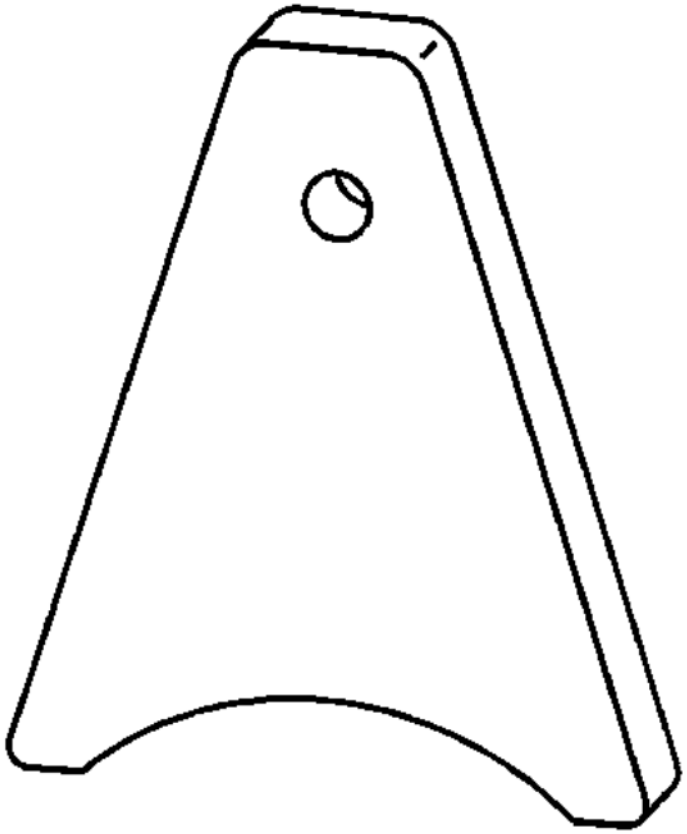
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Illustration	Tool Number/Description
	J 24429 Side Bearing Backlash Spanner

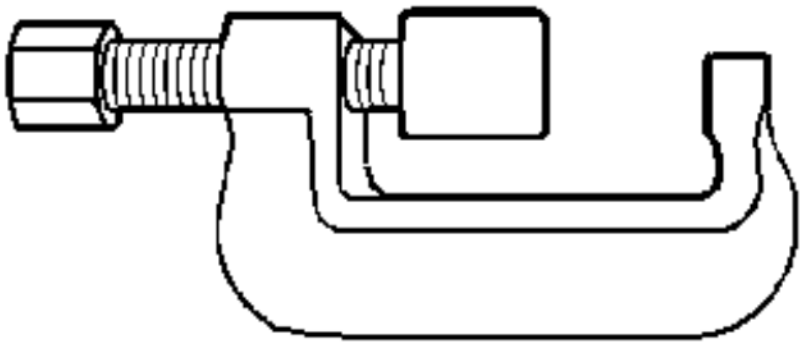
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Illustration	Tool Number/Description
	J 25025 Guide Pins

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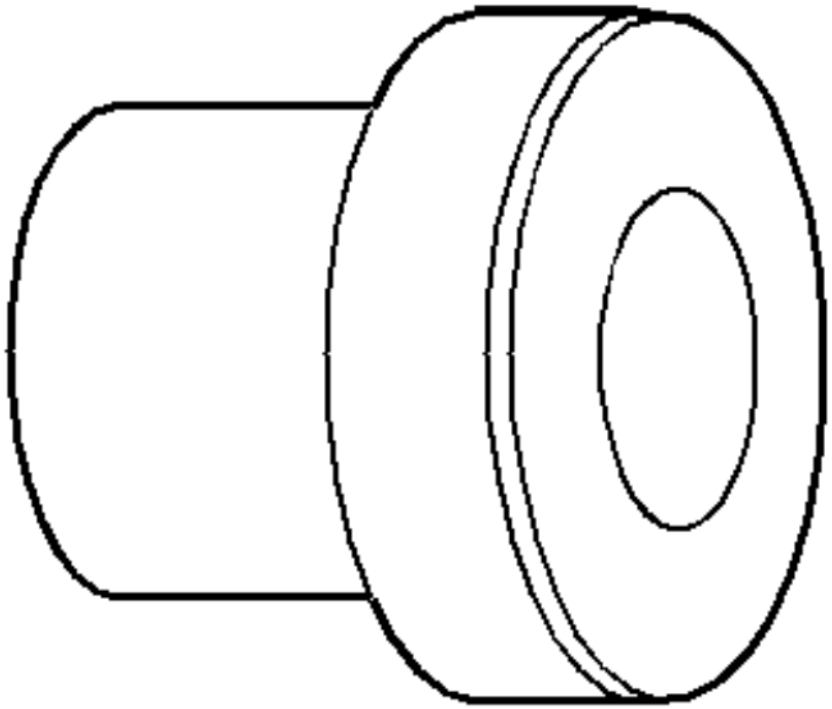
Illustration	Tool Number/Description
	J 25588 Side Bearing Shim Installer

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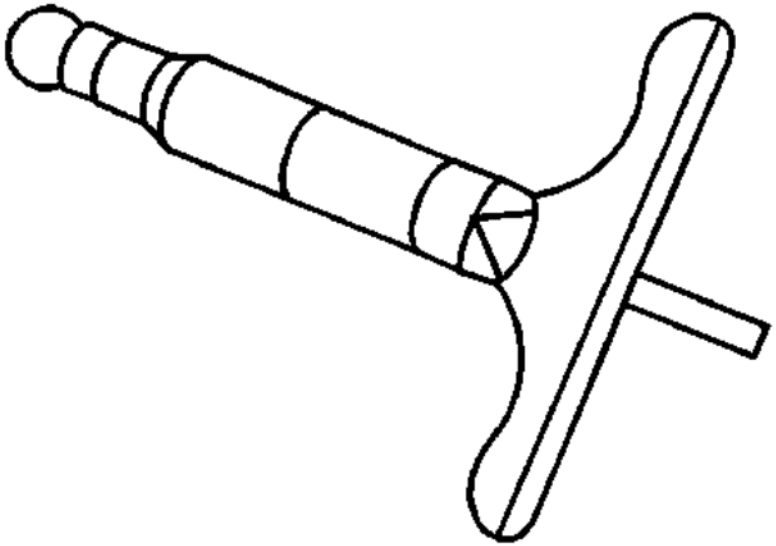
Illustration	Tool Number/Description
	J 26252 Locking Differential Governor Remover

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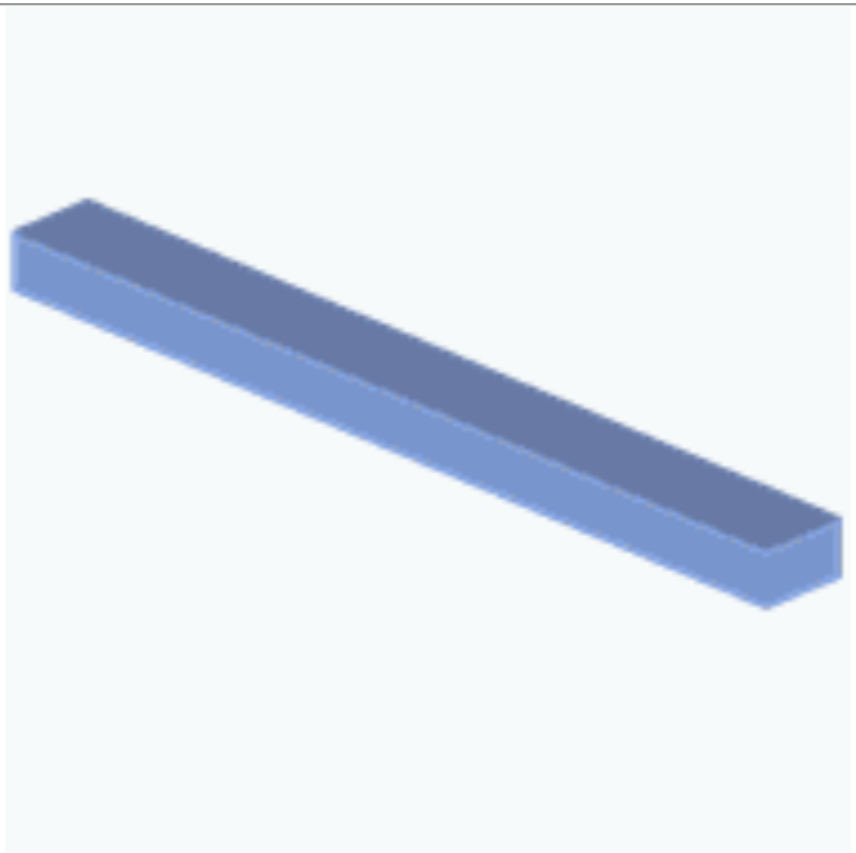
Illustration	Tool Number/Description
	J 29710 Differential Side Bearing Installer

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Illustration	Tool Number/Description
	J 34672 Depth Micrometer

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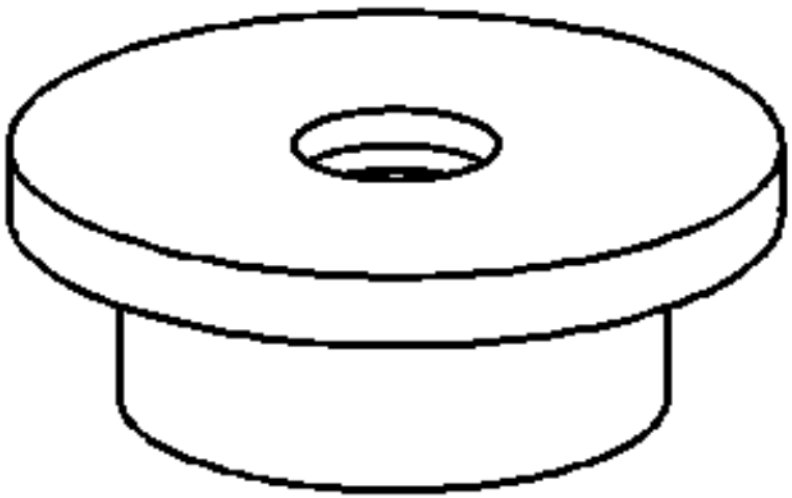
Illustration	Tool Number/Description
	J 34673 Flat Gauge Bar

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Illustration	Tool Number/Description
	J 34925 Pinion Setting Gauge and Components

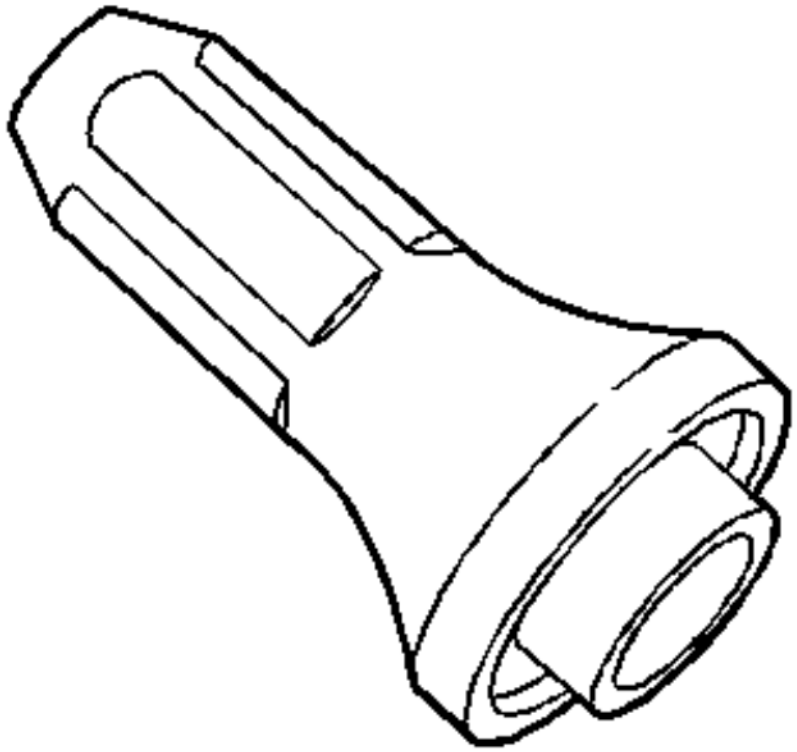
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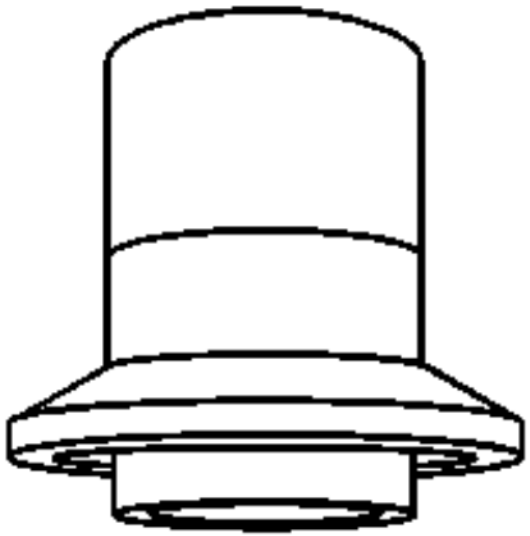
Illustration	Tool Number/Description
	J 37624 Pinion Bearing Installer

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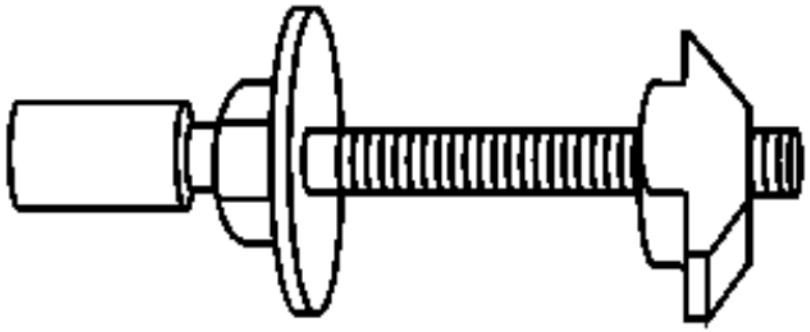
Illustration	Tool Number/Description
	J 38694 Seal Installer

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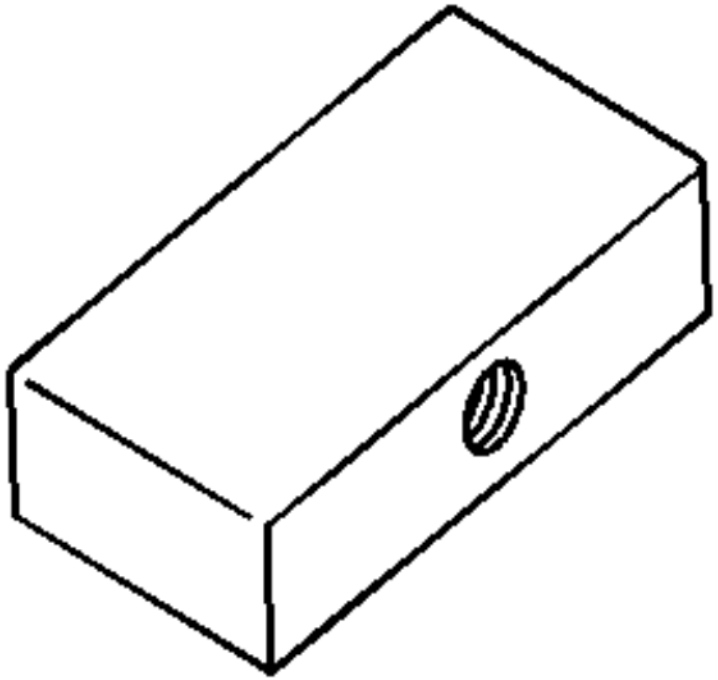
Illustration	Tool Number/Description
	J 44414 Pinion Seal Installer

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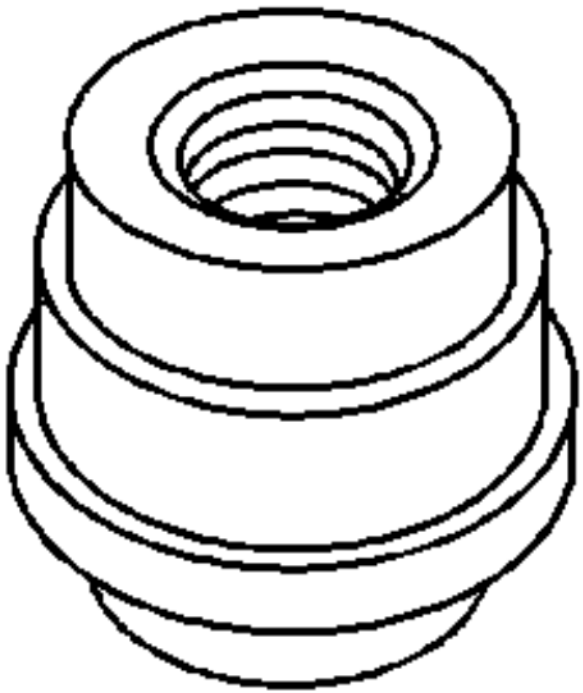
Illustration	Tool Number/Description
	J 44685 Rear Axle Seal and Bearing Remover

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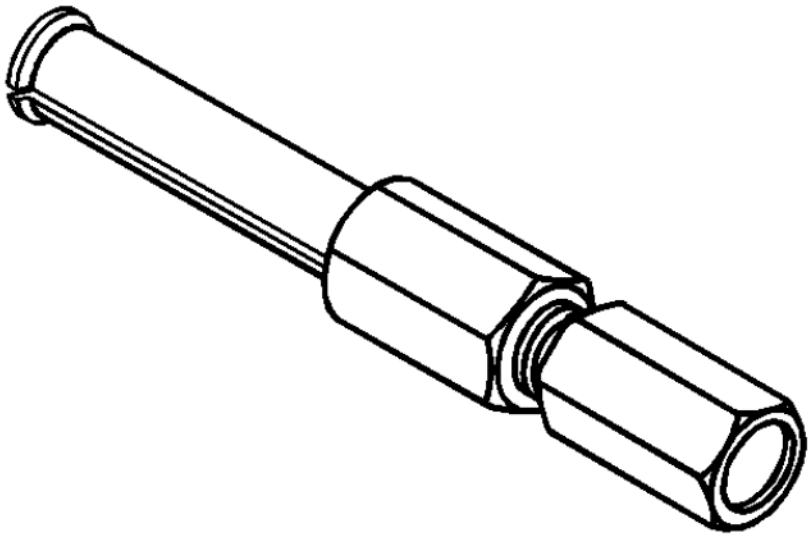
Illustration	Tool Number/Description
	J 45108 Pinion Setting Gauge Block

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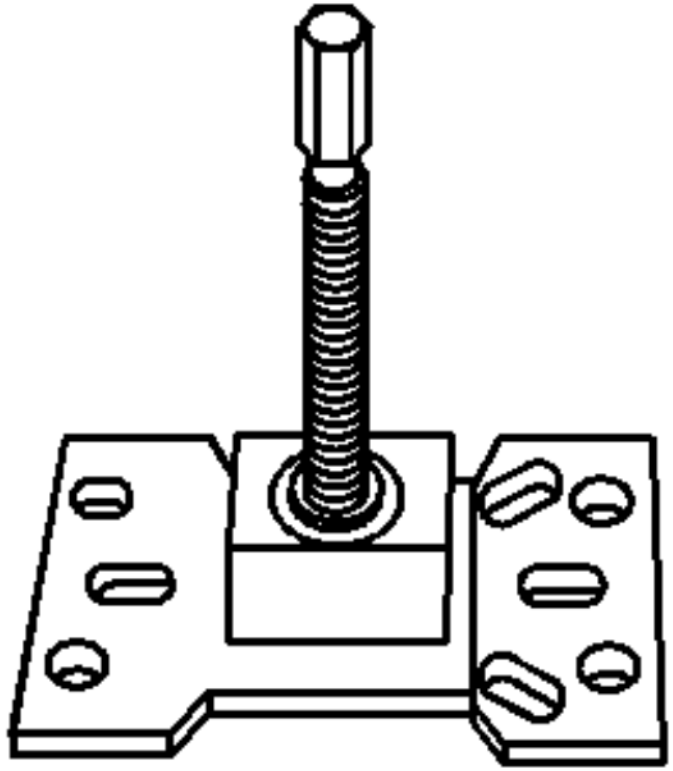
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Illustration	Tool Number/Description
	J 45232 Differential Side Bearing Adjuster Needle Bearing Installer

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Illustration	Tool Number/Description
	J 45857 Tone Wheel and/or Bearing Remover

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