# DESCRIPTION AND OPERATION

### DESCRIPTION

Tru-Lok is an electronically locking differential. The differential has four pinion gears, three pinion shafts and two side gears. On the back side of one side gear is half of the dog clutch.

NOTE: The actuator is a serviceable component.

### OPERATION

Pressing a two-way momentary rocker switch on the switch bank request axle lock. The first press DOWN requests rear axle to be locked, every other press DOWN toggles between "front and rear axle lock" and "rear axle lock" request states. Press rocker switch UP requests both axles to be unlocked. The switch is on the IP in the switch bank. The switch bank sends a message to the Instrument Panel Cluster (IPC). The IPC handles the switch debounce and switch diagnostics. Any one message sent by the IPC on the network is a valid switch change. The IPC passes the information via a Controller Area Network-Internal High Speed (CAN-IHS) message. There are three telltales on the cluster, "Rear", "Front", and "Lock". The telltales will be off if the axles are unlocked, flashing if there is a pending request to lock but the axles are not yet locked (transition to lock, torque-locked, or conditions not correct), and flashing rapidly if there is a fault. The “Front” and “Rear” telltales will match the front and rear differential states. The “Lock” telltale will be on solid if either the “Front” or “Rear” telltale is on or blinking. For more information on locker operation (Refer to 08 - Electrical/8E - Electronic Control Modules/MODULE, Drivetrain Control/Description and Operation).

# AXLE LOCK ELECTRICAL REQUIREMENTS

Software Latch Feature: The axle will have a software latch of the axle switch during an ignition switch OFF when the vehicle is in 4 LO transfer case position. Upon ignition key RUN or START the software latch shall check to verify conditions are correct for an axle lock and automatically lock the axles that were locked before the ignition was turned OFF.

NOTE: The electric locking differential is serviced as an assembly.

# DIAGNOSIS AND TESTING - DIFFERENTIAL - TRU-LOK

The electronic control module for the electronically locking differentials detects faults from input signal/messages, sensors, solenoids, and drivers/relays and report the corresponding Diagnostic Trouble Code (DTC).

The following description outlines the lighting strategy for the axle lock switch:

The FRONT AXLE LED will:

- Turn ON SOLID when the front axle is locked
- Turn ON BLINKING when the front axle is attempting to lock
- Turn ON BLINKING when a lock front axle request is received but conditions to lock are not correct
- Turn OFF when the axle is UNLOCKED
- Turn ON FAST BLINKING when there is a fault detected for the front axle

The REAR AXLE LED will:

- Turn ON SOLID when the rear axle is locked
- Turn ON BLINKING when the rear axle is attempting to lock
- Turn ON BLINKING when a lock rear axle request is received but conditions to lock are not correct
- Turn OFF when the axle is UNLOCKED
- Turn ON FAST BLINKING when there is a fault detected for the rear axle

## INDICATOR SWITCH

Ohmmeter set on continuity: One lead on each connector terminal

- Switch Plunger IN Locker Not Engaged - No Continuity
- Switch Plunger OUT Locker Engaged - Continuity

**03 - Differential and Driveline/Front Axle - M210/CASE ASSEMBLY, Differential, TRU-LOK/Removal and Installation**

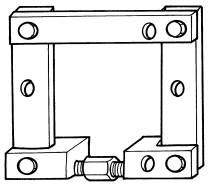
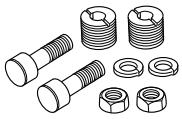
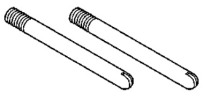
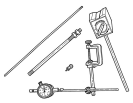
# REMOVAL AND INSTALLATION

⊟ **Labor Operations:** Click to hide the list of LOPs associated with this procedure

No LOP information available for this service procedure.

⊟ **Special Tools:** Click to hide the list of tools used in this procedure

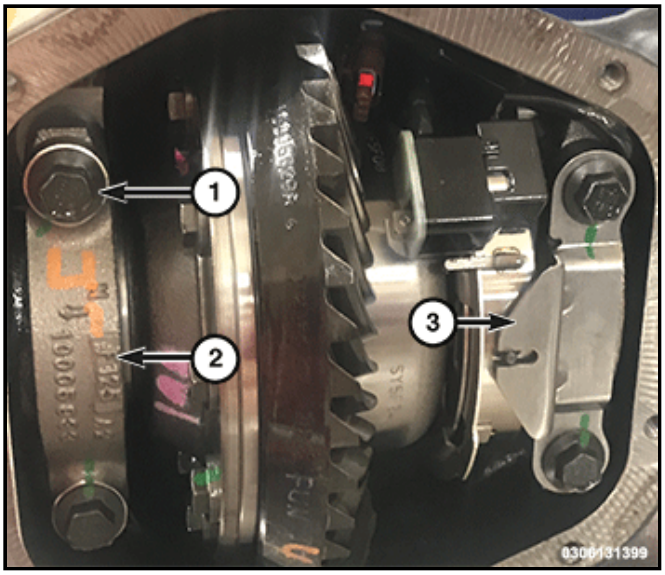
Click here to launch the form to order any tools you need.

| | |
|---|---|
|  | W-129-B - Spreader, Differential<br>Originally Shipped In Kit Number(s) *9975*. |
|  | 6987B - Adapter Kit, Axle Spreader<br>Originally Shipped In Kit Number(s) *6980, 6994, 6995, 8653*. |
|  | C-3288-B - Set, Alignment Pins<br>Originally Shipped In Kit Number(s) *9975*. |
|  | C-3339A - Set, Dial Indicator<br>Originally Shipped In Kit Number(s) *9202*. |

**REMOVAL**

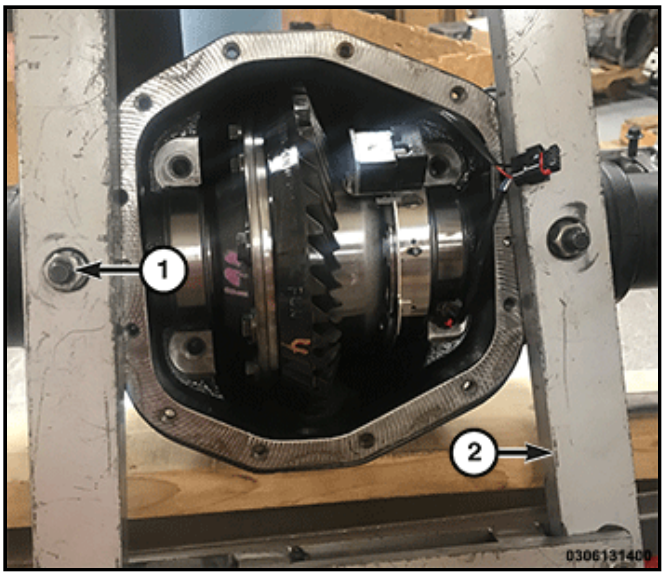
1. Remove the differential cover (Refer to 03 - Differential and Driveline/Front Axle/COVER, Differential/Removal and Installation) .
2. Remove the left tie rod end from the knuckle and secure out of the way (Refer to 19 - Steering/Linkage, Link and Coil/END, Tie Rod/Removal and Installation) .
3. Remove the track bar (Refer to 02 - Front Suspension/Front/TRACK BAR, Front/Removal and Installation) .
4. Remove the axle shafts (Refer to 03 - Differential and Driveline/Front Axle/SHAFT, Axle/Removal and Installation) .
5. Note the reference letters (2) stamped on the bearing caps and differential housing machined sealing surface.

6. Loosen the differential bearing cap bolts (1). Notice the orientation of the axle locker actuator bracket (3) when removing the bearing caps.

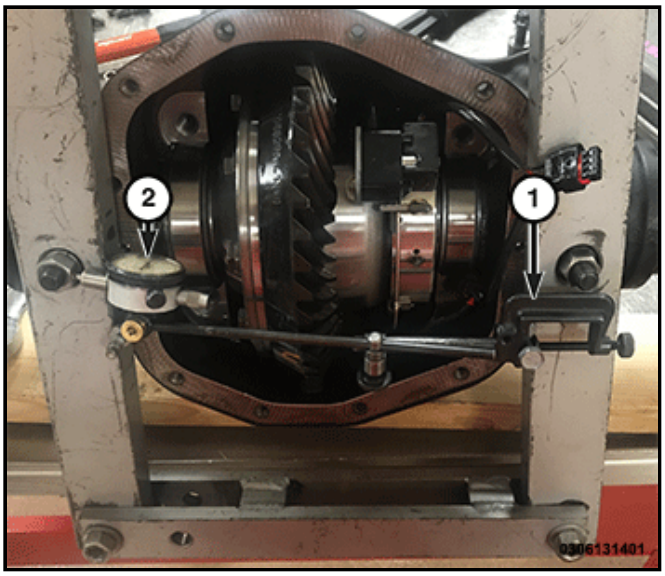



**NOTE: Never spread the differential housing over 0.54 mm (0.022 in.). Failure to follow these instructions will damage the housing.**

7. Position the spreader W-129-B (2) with the adapter kit 6987B on the differential locating holes. Install the hold-down clamps (1) and tighten the turnbuckle finger-tight.




8. Install a pin C-3288-B at the left side of the differential housing. Attach the dial indicator C-3339A (1, 2) to the pin. Load the indicator plunger against the opposite side of the housing and zero the indicator (2).




9. Spread the differential housing while measuring the distance with the dial indicator (2).

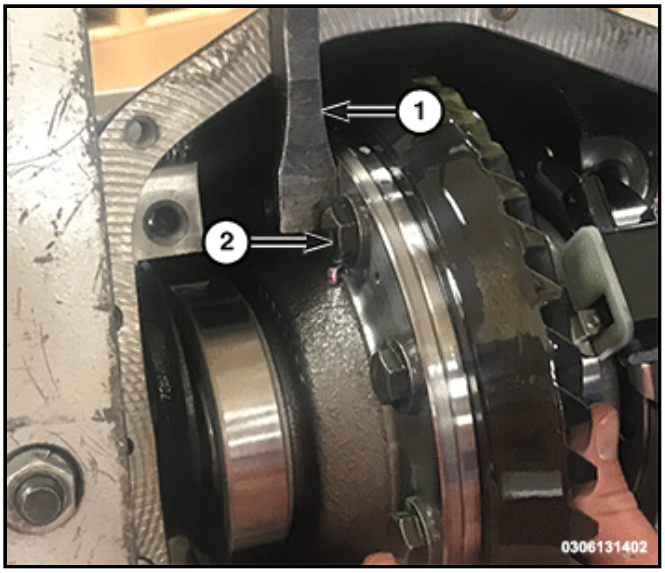
**CAUTION:**

**Never spread housing over 0.50 mm (0.020 in). Failure to follow these instructions will damage the housing.**

10. Remove the dial indicator.

11. Holding the differential case in position, remove the differential bearing caps.

12. Remove the differential case (2) from the differential housing using a small pry bar (1) or similar. Tag the differential bearing cups and washer locations.




13. Remove the spreader from differential housing.

14. Clean the housing cavity with flushing oil, light engine oil or lint free cloth.

**NOTE:**

**Do not use water, steam, kerosene or gasoline for cleaning.**

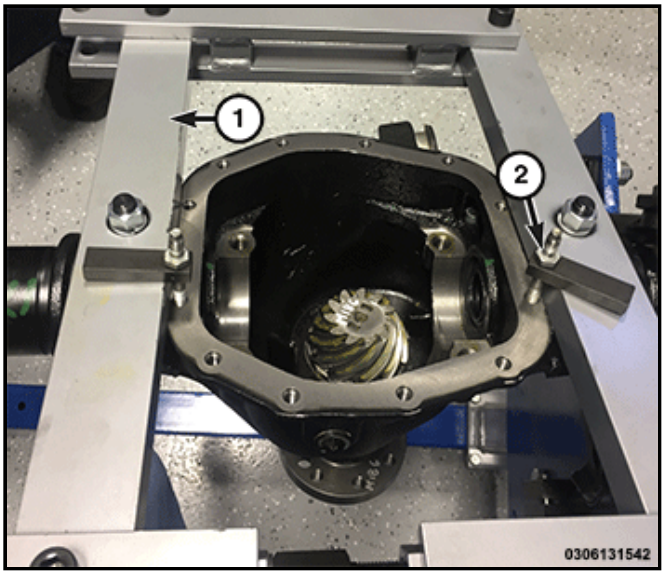
## INSTALLATION

**NOTE:**

**If replacement differential bearings or differential case are being installed, the differential side bearing washer requirements may change (Refer to 03 - Differential and Driveline/Front Axle/Adjustments) to determine the proper washer selection.**

1. Position the spreader W-129-B onto the dowel pins from the adapter kit after 6987B seating the dowel pins in the differential housing locating holes. Install the hold-down clamps (2) and tighten the turnbuckle finger-tight.

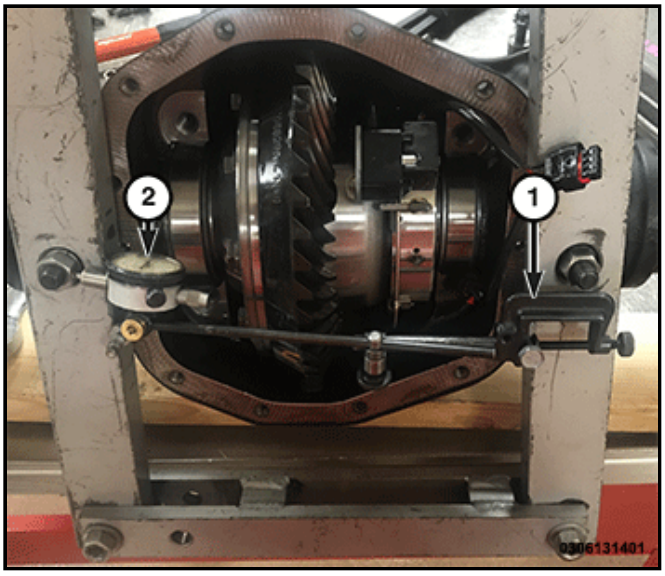
2. Install the pin (2) C-3288-B at the left side of the differential housing. Attach the dial indicator C-3339A to the pin. Load the indicator plunger against the opposite side of the housing and zero the indicator.




3. Spread the differential housing while measuring the distance with the dial indicator.

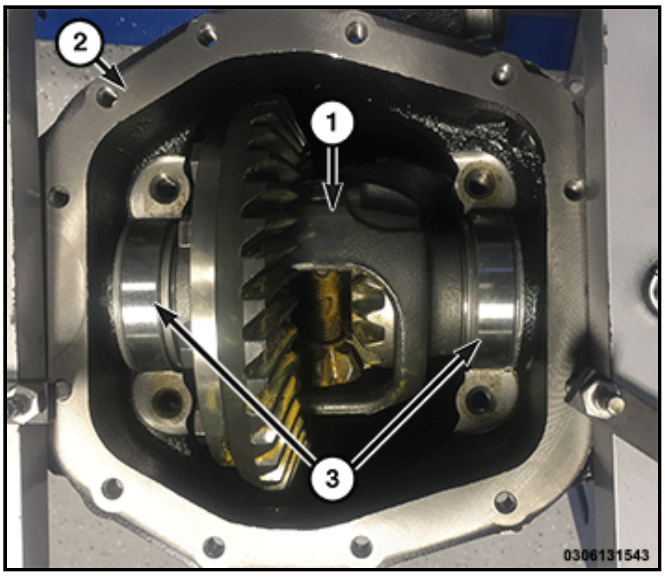
**NOTE: Never spread the differential housing over 0.54 mm (0.022 in.). Failure to follow these instructions will damage the housing.**

**NOTE: Image shown with differential case installed. The image is solely to reference dial indicator set up.**



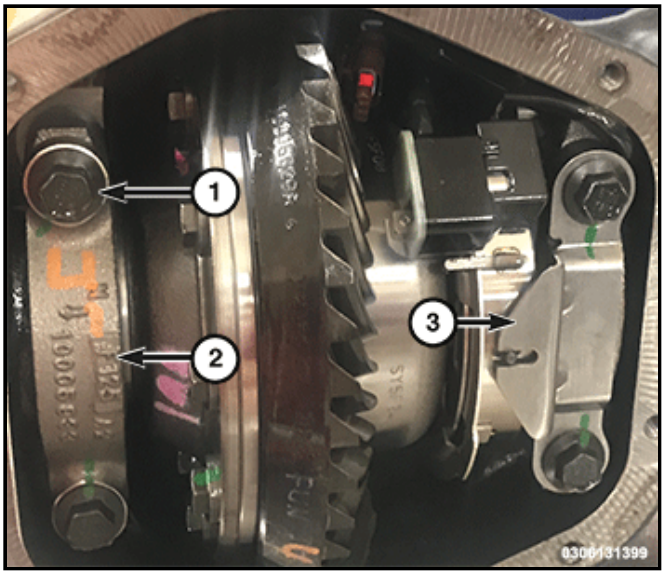

4. Remove the dial indicator.

5. Install the differential case (1) into the differential housing (2) with bearing cups (3) and preload washers. Tap the differential case to ensure the bearings cups (3) are fully seated in the differential housing.

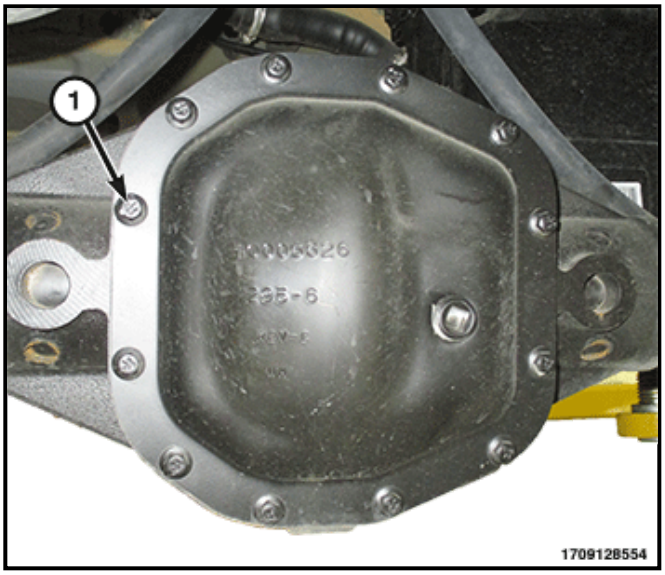



6. Install the bearing caps with reference marks (2) in their original locations. Install the axle locker actuator bracket

(3) on the locker side of the differential. Center the pin from the axle locker actuator in the slot in the axle locker actuator bracket (3).




7. Loosely install the differential bearing cap bolts (1).
8. Remove the differential housing spreader.
9. Tighten the bearing cap bolts (1) to the proper (Torque Specifications) .
10. Install the axle shafts (Refer to 03 - Differential and Driveline/Front Axle/SHAFT, Axle/Removal and Installation) .
11. Install the track bar (Refer to 02 - Front Suspension/Front/TRACK BAR, Front/Removal and Installation) .
12. Install the left tie rod end (Refer to 19 - Steering/Linkage, Link and Coil/END, Tie Rod/Removal and Installation) .
13. Install the differential cover (Refer to 03 - Differential and Driveline/Front Axle/COVER, Differential/Removal and Installation) .
14. Fill the differential with the proper fluid (Refer to 04 - Vehicle Quick Reference/Capacities and Recommended Fluids/Specifications) .



**03 - Differential and Driveline/Front Axle - M210/CASE ASSEMBLY, Differential, TRU-LOK/Disassembly and Assembly**

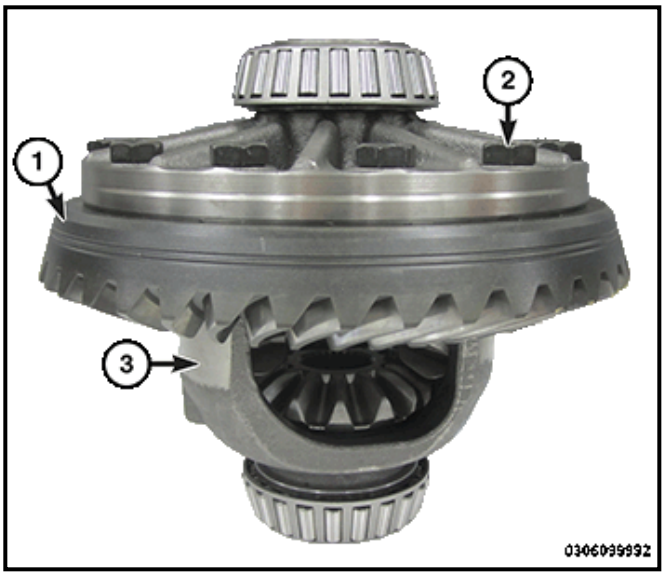
# DISASSEMBLY AND ASSEMBLY

⊟ **Labor Operations:** Click to hide the list of LOPs associated with this procedure

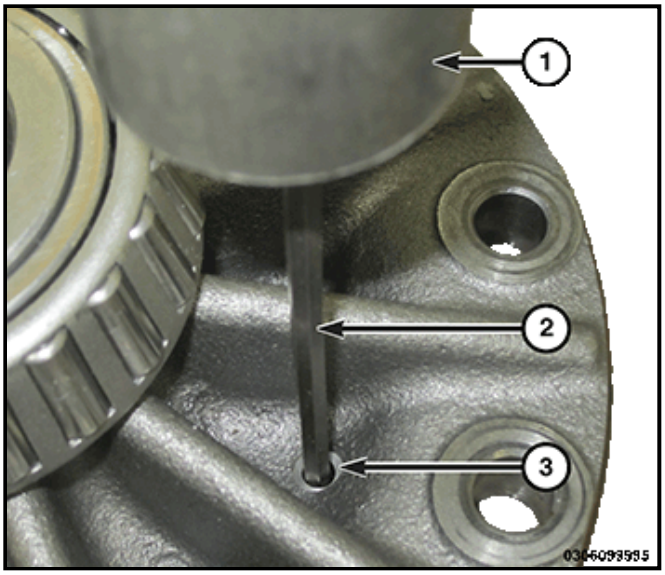
No LOP information available for this service procedure.

## DISASSEMBLY

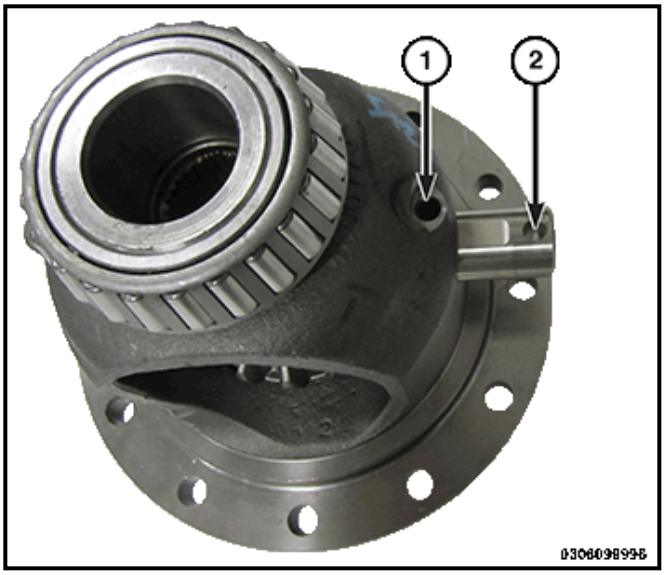
1. Remove and **DISCARD** the ring gear bolts (2) and remove the ring gear (1) from the differential case (3).



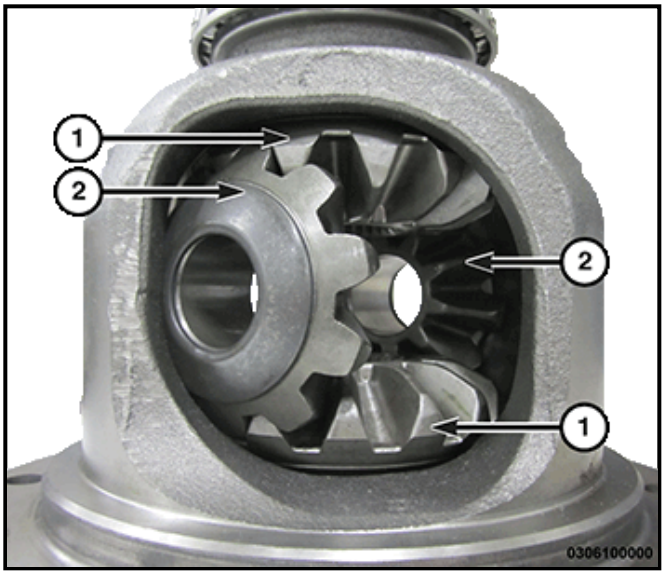

2. Remove the pinion mate shaft roll pin (3) with a punch (2) and hammer (1).




3. Remove the pinion mate shaft (2) from the differential case (1) and the pinion gears.

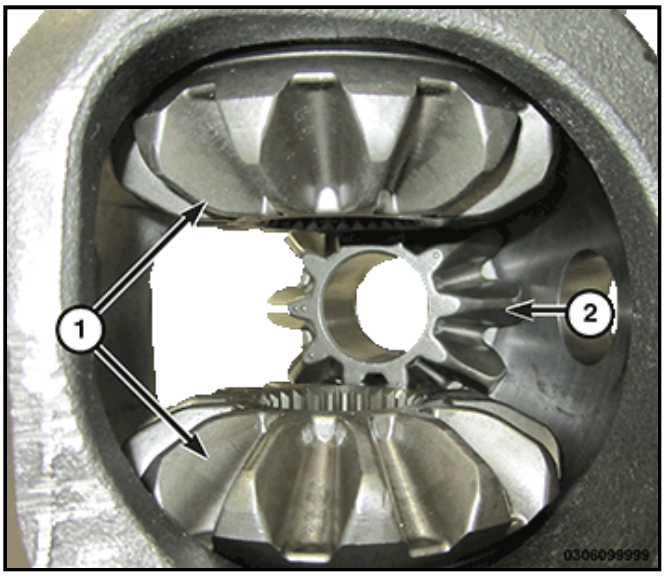



4. Rotate the differential side gears (1) to expose the pinion gears to the differential windows.




5. Remove the pinion gears (2) with the thrust washers through the differential windows.

6. Remove the differential side gears (1) with thrust washers through the differential window.

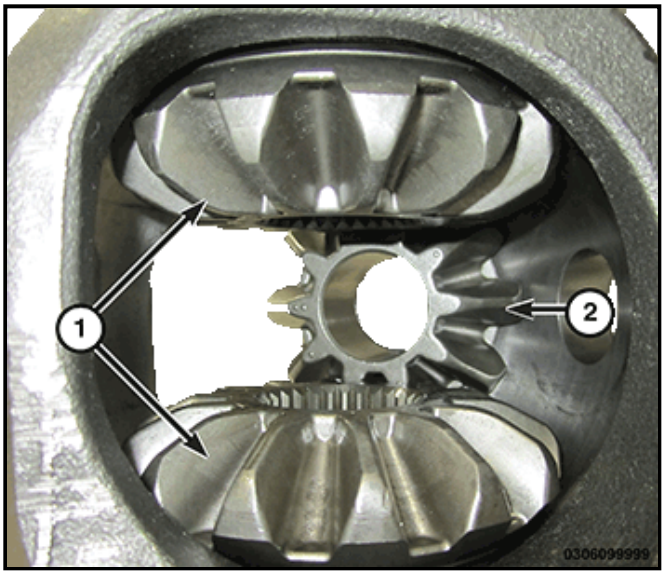



**ASSEMBLY**

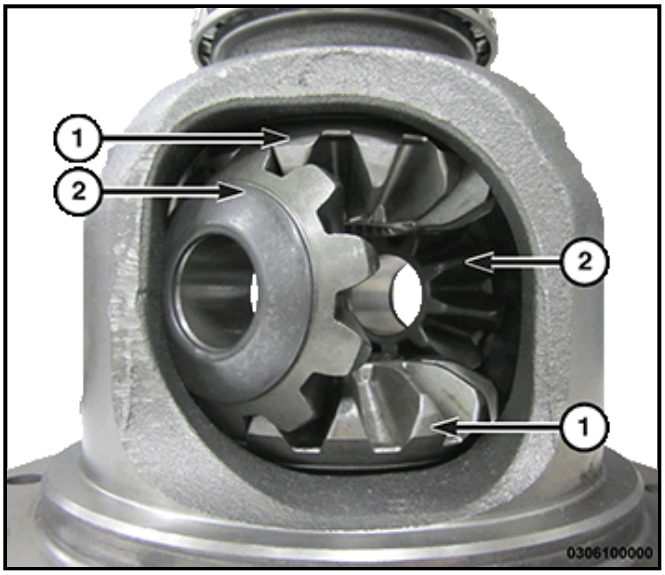
**NOTE:**

**If the same gears and thrust washers are being used, install them into their original locations.**

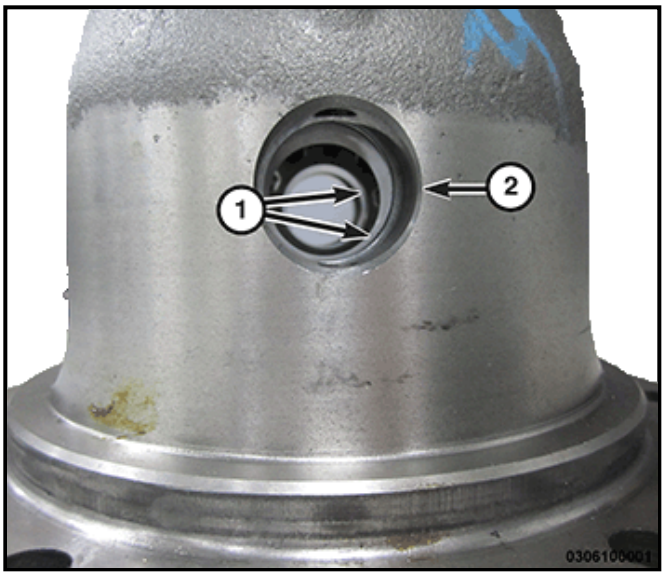
1. Lubricate all differential components with axle lubricant.




2. Install the differential side gears (1) with the thrust washers through the differential window.

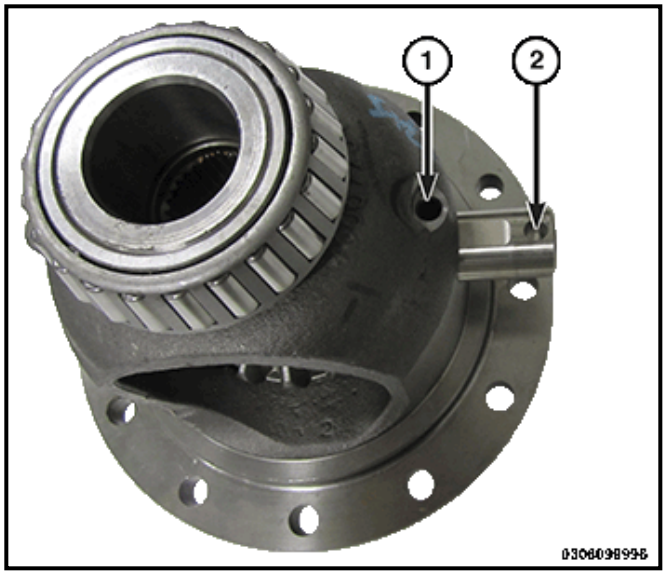



3. Install the pinion gears (2) with the thrust washers through differential windows.

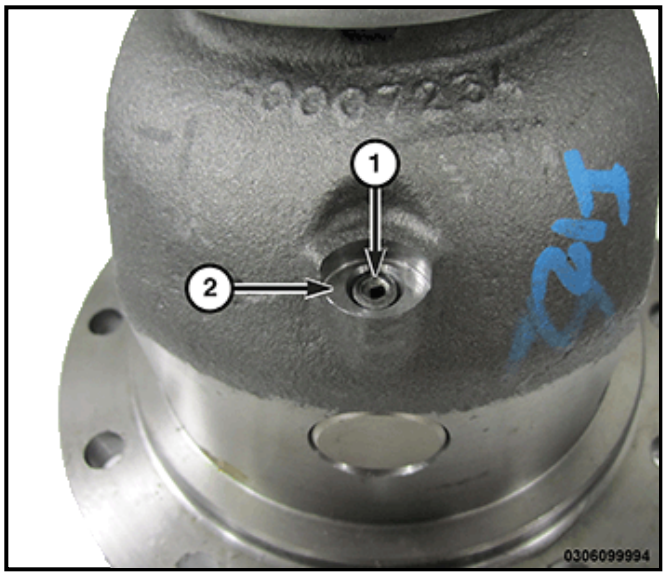



4. Rotate the pinion gears (1) with the thrust washers and align the gears to the pinion mate shaft hole (2).

5. Install the pinion mate shaft (2) in the differential case and pinion gears while keeping the pinion mate shaft roll pin hole aligned with the opening (1).




6. Install the pinion mate shaft roll pin (1) in the differential case (2) and through the pinion mate shaft.




7. Install the ring gear (1), the **NEW** ring gear bolts (2) on the differential case (3) and alternately tighten to the proper (Torque Specifications) .