

*INSTALLATION MANUAL*

***HBE 129***

**ENG**

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***ADVANCED DIFFERENTIAL LOCKING SYSTEM***



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## OPERATION, TOOLS AND SUPPLIES FOR INSTALLATION

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### WARNING

Installation of the differential locker should be performed by a qualified automotive service technician.

If you intend to install the differential locker yourself, ensure that all required tools and supplies listed in this manual are available. A factory service manual for the vehicle is also required.

Before beginning installation, verify that the electric locker kit is complete and contains all supplied components. If any parts are missing, contact customer support at [hardblockusa.com](http://hardblockusa.com).

### WARNING

Do not operate the vehicle on public roads with the differential locked. This may result in loss of vehicle control.

The electronic locker is designed to allow engagement and disengagement while the vehicle is moving. However, engaging the locker at higher speeds may result in loss of vehicle control. Use caution when operating the locker.

There are no tire size restrictions when using this differential locker.

### PARTS LIST

- Wire harness
- Bracket
- Rubber seal
- Installation manual
- Differential locking system

### REQUIRED TOOLS

- Standard automotive tools in metric and/or imperial sizes (sockets, wrenches, and drill bits)
- Dial indicator
- Torque wrench (refer to the vehicle service manual for the required torque range)
- Fluid drain pan
- Suitable measuring tools for measuring bearing preload

## 4. CHECKING THE OPERATION OF THE ELECTRIC LOCKER

After completing the electrical connections, verify the operation of the electric locker.

**4.1** Install one of the axle shafts into the differential.

**4.2** Set the lock switch to the ON position.

**4.3** Rotate the pinion gear while holding the axle shaft. The electric locker should engage, preventing rotation of the pinion gear relative to the axle shaft.

**4.4** Set the lock switch to the OFF position.

**4.5** Rotate the pinion gear while holding the axle shaft. The electric locker should disengage, allowing the pinion gear to rotate freely relative to the axle shaft.

### WARNING

Rotation in both the locked and unlocked states should be smooth, without jerking or resistance.

**4.6** Repeat the ON/OFF activation of the electric locker several times.

**NOTE:** If the electric locker activates abnormally, contact customer support at [hardblockusa.com](http://hardblockusa.com).

**4.7** After verifying proper operation of the electric locker, continue assembling the axle housing according to the vehicle manufacturer's service manual.

**4.8** After completing the final assembly of the axle housing, fill it with the specified differential gear oil. Then check the operation of the electric locker again as described above.

### WARNING

When driving the vehicle for the first time with the electric locker installed, it is strongly recommended to perform 5–10 ON/OFF cycles over several minutes. Operate the vehicle at low speed and make gentle turns without stopping. The locker must engage and disengage smoothly and reliably.

## OPERATION, TOOLS AND SUPPLIES FOR INSTALLATION

- 1/2" drill bit
- Differential carrier bearing puller
- Bearing press
- Center punch
- Paint marker
- Hammer with a plastic, rubber, or copper head
- Bench vise with copper, wood, or plastic vise jaws

### REQUIRED SUPPLIES

- Replacement differential cover gasket or gasket sealant for the differential cover
- Sufficient differential gear oil to completely refill the axle housing (refer to the vehicle manufacturer's service manual for the specified lubricant)
- Differential - adjusting shims kit.

## 1. REMOVING THE EXISTING DIFFERENTIAL

1.1 Secure the vehicle on a lift. A vehicle lift is recommended to keep the differential at a comfortable working height and to allow the wheels and axles to rotate freely during removal.

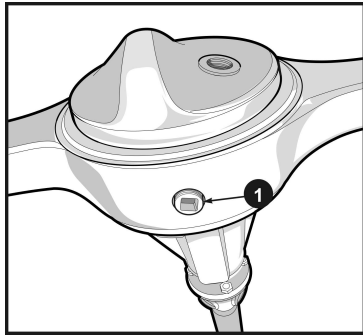


Fig. 1

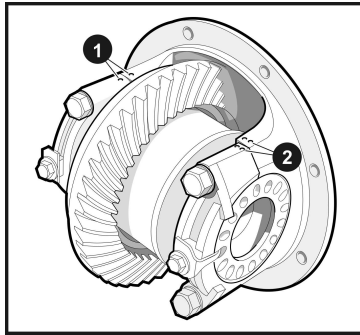


Fig. 2

1.2 Place a fluid drain pan under the axle housing. Remove the drain plug (1) and allow the gear oil to completely drain into the pan. (Fig. 1)

1.3 Remove the axle shafts in accordance with the vehicle service manual.

1.4 Disconnect the driveshaft from the differential drive flange in accordance with the vehicle service manual.

1.5 Remove the bolts securing the differential carrier to the axle housing and remove the carrier assembly.

1.6 Clean any oil residue and contaminants from the axle housing.

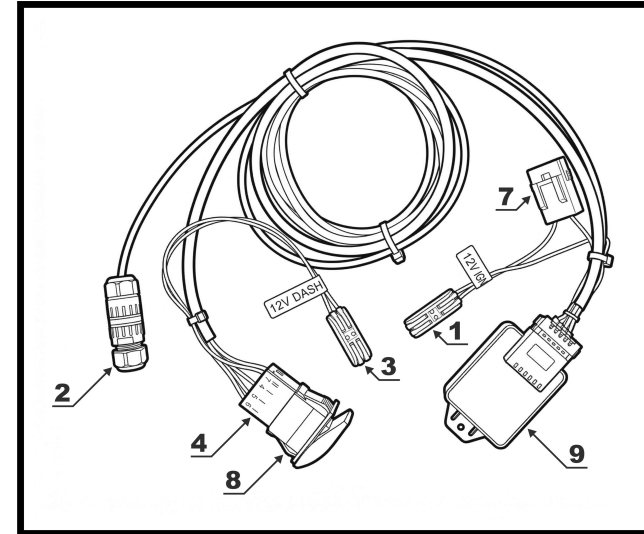
1.7 Using a center punch, mark the bearing caps for reinstallation. The marks should be placed on both the bearing cap and the adjacent area of the differential carrier. On one side, make two punch marks (2); on the opposite side, make one punch mark (1), as shown in (Fig. 2).

### CHECKING THE CURRENT BACKLASH AMOUNT

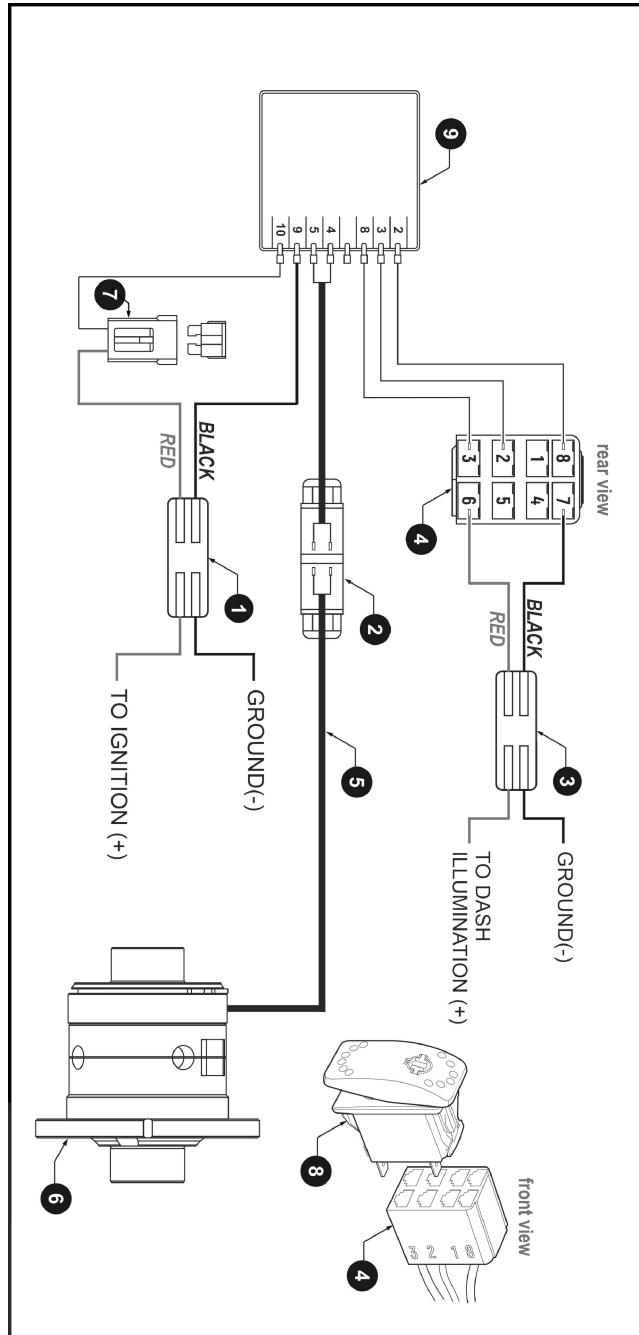
It is necessary to verify that the existing ring gear and pinion gear are in good condition and do not require replacement. Depending on the condition of the gears, follow the applicable instructions below.

- If the existing ring gear and pinion gear will be replaced with new components, measurement of the existing backlash during differential removal is not required. In this case, backlash adjustment during installation of the electric locker must be performed in accordance with the gear manufacturer's specifications for the new ring and pinion set. (skip steps 1.8 and 1.9.)

## ELECTRICAL SYSTEM CONNECTION DIAGRAM



- 1 — Connector (to Ignition)
- 2 — Waterproof connector
- 3 — Connector (to dash illumination)
- 4 — Button wire connector
- 5 — Magnet cable
- 6 — Electric locker
- 7 — Fused power wire (5 A)
- 8 — Lock switch
- 9 — Differential lock control unit



- If the existing ring gear and pinion gear will be reused with the electric locker, the backlash must be measured during removal of the original differential. The measured backlash value must be reproduced during installation of the electric locker. Do not rely on the backlash specification listed in the vehicle manufacturer's service manual, as those values apply to new ring and pinion gears. In used gear sets, normal wear typically increases backlash. Failure to restore the measured backlash value during installation may result in improper operation or damage to the ring and pinion gears.

**WARNING**  
Do not replace the existing ring and pinion gear set with used components. Installing a used gear set from another vehicle may result in improper axle operation and possible damage to the axle assembly.

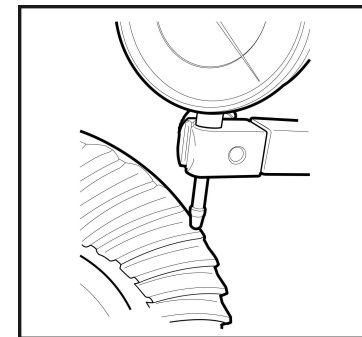


Fig. 3

- 1.8 Install a dial indicator. Secure the indicator holder to the outside of the axle housing and position the dial indicator tip perpendicular to a tooth of the ring gear. (Fig. 3)

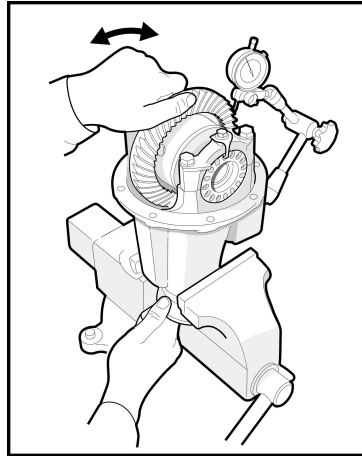


Fig. 4

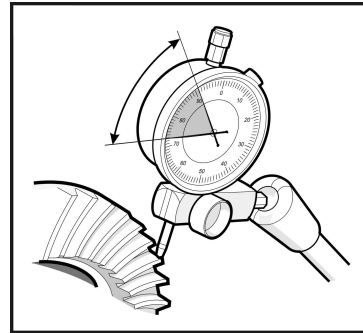


Fig. 5

1.9 Hold the driveshaft flange to prevent the pinion from rotating. Rotate the ring gear back and forth until it stops in each direction, and observe the dial indicator reading (Fig. 4, Fig. 5). Record the measured value in the appropriate row of the table (Value 1). For improved accuracy, repeat the measurement two additional times. Before each measurement, rotate the differential approximately 120°. Record the readings in the table (Values 2 and 3), then calculate the arithmetic mean of the three measurements.

RECORD BACKLASH HERE	
Value 1	
Value 2	
Value 3	
Mean	

**NOTE:** To prevent damage to the dial indicator, move the indicator tip away from the ring gear teeth before rotating the differential. Rotate the differential approximately 120° before taking the next measurement.

3.27 Complete the assembly of the axle housing in accordance with the procedure specified in the vehicle manufacturer's service manual.

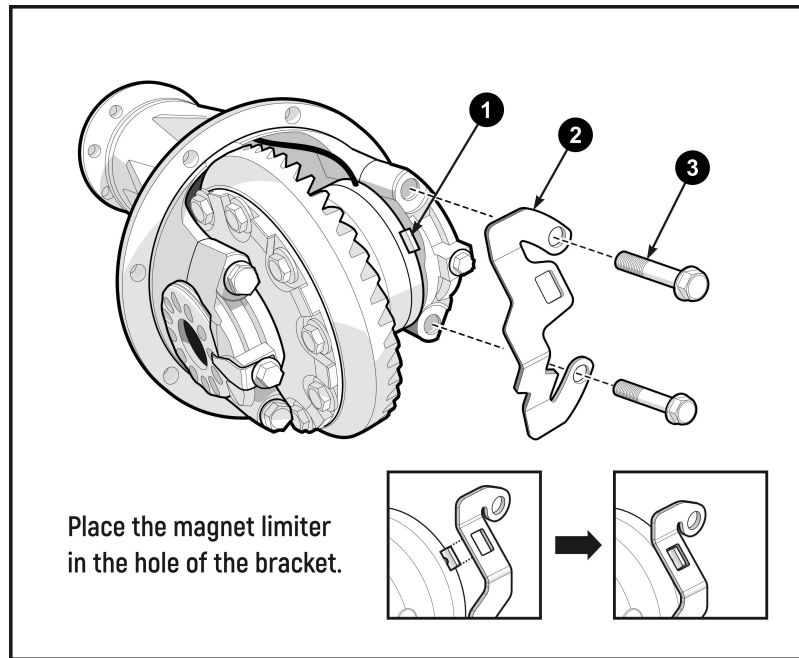


Fig. 29

- 3.23 Remove the bolts (3) from the right bearing cap. (Fig. 29)
- 3.24 Install the bracket (2) on the right bearing cap. Rotate the magnet so that the magnet limiter (1) engages the hole in the bracket (2). Install the bearing cap bolts (3) through the bracket and into the bearing cap, then tighten them. (Fig. 29).
- 3.25 Verify that the magnet limiter has slight clearance within the bracket hole. To check this, rotate the magnet up and down. The magnet should move slightly while the magnet limiter contacts the upper and lower edges of the bracket hole. If no clearance is present, slightly adjust the position of the bracket relative to the bolts and check again.
- 3.26 After confirming the correct limiter clearance, tighten the bearing cap bolts using a torque wrench to the specification provided in the vehicle manufacturer's service manual.

#### WARNING

Ensure that the differential is in the unlocked position. Install the axle shaft and rotate it while holding the pinion flange. The axle shafts must rotate freely while the pinion gear remains stationary.

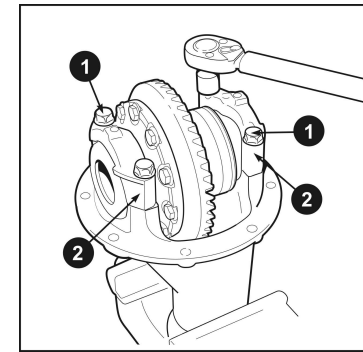


Fig. 6

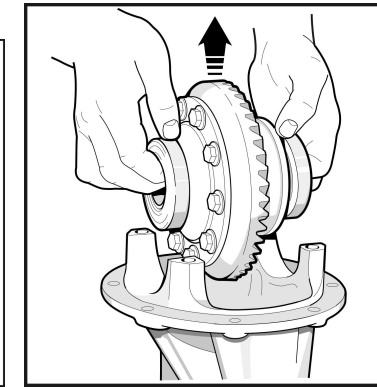


Fig. 7

- 1.10 Remove the bolts (1) and remove the bearing caps (2). (Fig. 6)
- 1.11 Carefully remove the differential carrier assembly with the bearings. (Fig. 7)

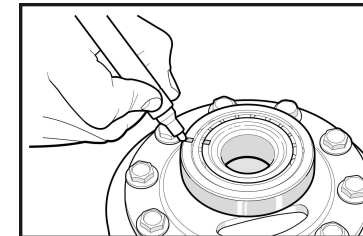


Fig. 8

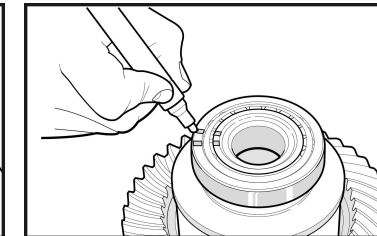


Fig. 9

- 1.12 Mark the inner and outer bearing races as shown in the illustration. (Fig. 8, Fig.9)

## 1. REMOVING THE EXISTING DIFFERENTIAL

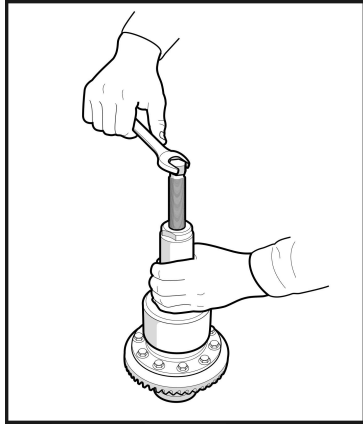


Fig. 10

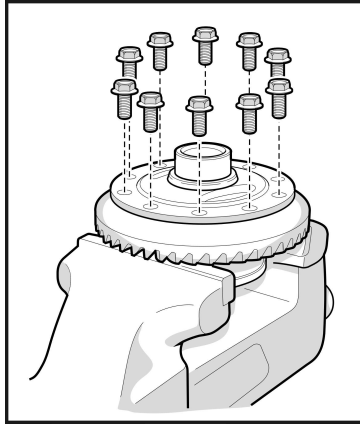


Fig. 11

1.13 Using a bearing puller, remove the carrier bearings from the differential carrier. (Fig. 10)

1.14 Remove the bolts securing the ring gear to the differential carrier. (Fig. 11)

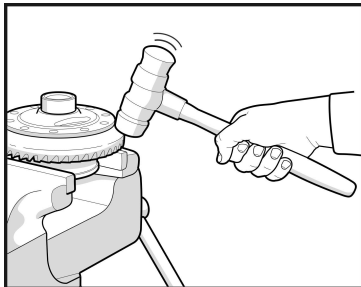


Fig. 12

1.15 Using a hammer with a plastic, rubber, or copper head, carefully tap the ring gear to separate it from the differential carrier. To prevent the ring gear from binding, tap evenly around the circumference. (Fig. 12)

### WARNING

Do not use a hammer with a steel head.

## 3. INSTALLING THE ELECTRIC LOCKER

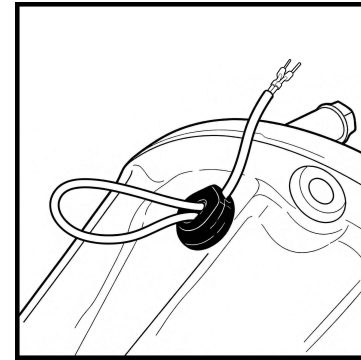


Fig. 27

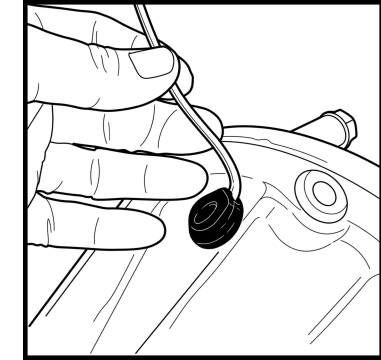


Fig. 28

3.19 Apply gasket maker to the narrow section of the rubber seal that will be inserted into the carrier hole.

3.20 Insert the rubber seal into the hole in the differential carrier. Remove any excess gasket maker. (Fig. 27)

3.21 Adjust the length of the magnet cable inside the carrier so that the cable does not stretch and does not touch the moving parts of the differential. If the cable is stretched, pull it slightly into the axle housing; if there is too much cable in the axle housing, pull it out.

3.22 While holding the rubber seal in place with one hand, pull the end of the cable through the side opening with the other hand. This will allow the magnet cable to rotate and lock into position at a 90° angle in the cable gland. (Fig. 28)

### 3. INSTALLING THE ELECTRIC LOCKER

#### WARNING

If the existing ring and pinion gear set is being replaced with a new one, set the backlash in step 3.16 according to the specifications provided by the gear manufacturer.

**3.16** Using a dial indicator, adjust the ring gear backlash to the value recorded in step 1.9. Measure the backlash at three different positions of the ring gear and calculate the arithmetic mean of the measurements. Compare the result with the value obtained in step 1.9. If the backlash is greater than specified, rearrange the shims to move the ring gear closer to the pinion gear. If the backlash is less than specified, rearrange the shims to move the ring gear away from the pinion gear. After each shim adjustment, tighten the bearing cap bolts to the manufacturer's specified torque before taking a new measurement. This is necessary to ensure accurate backlash measurement.

**3.17** After completing the backlash adjustment, tighten the bearing cap bolts using a torque wrench to the specification provided in the vehicle manufacturer's service manual.

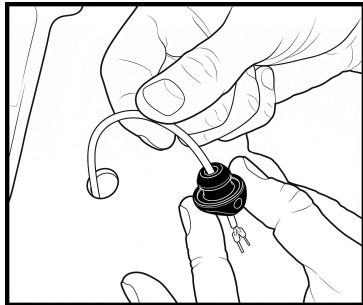


Fig. 25

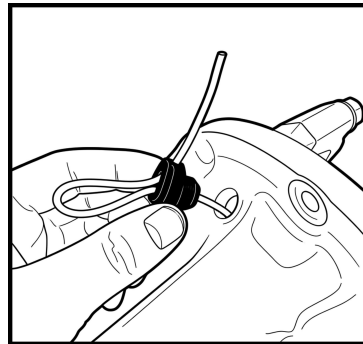


Fig. 26

**3.18** Install the rubber seal onto the magnet cable by pressing the cable into the longitudinal slot and routing it through the side opening. (Fig. 25, 26)

### 2. INSTALLING THE RING GEAR

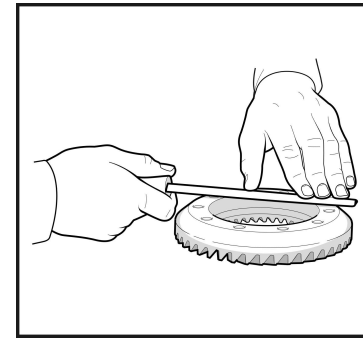


Fig. 13

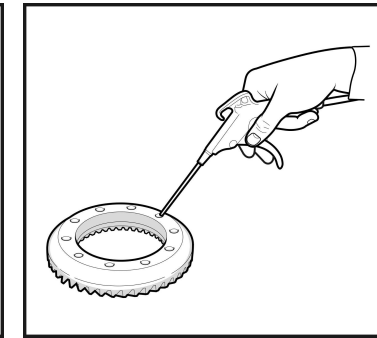


Fig. 14

**2.1** Lightly pass a fine file over the edges of the differential carrier flange and the back face of the ring gear. Burrs may occur during shipping and can interfere with proper gear seating. (Fig. 13)

**2.2** Blow off the back face of the ring gear and the bolt holes using compressed air. (Fig. 14)

**NOTE:** Ensure that the mating surfaces of the ring gear and differential carrier are clean and free of burrs, dirt, and oil.

**2.3** Degrease the ring gear bolt holes and the ring gear bolts using a suitable solvent.

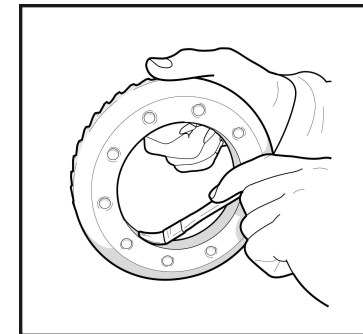


Fig. 15

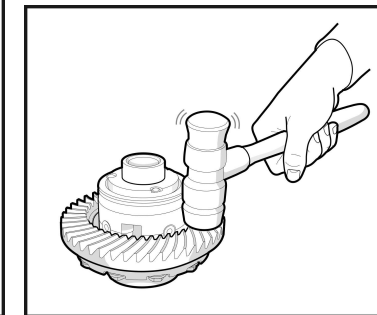


Fig. 16

**2.4** Apply a thin layer of high-pressure grease to the inner bore of the ring gear before installing it on the differential carrier to facilitate installation. (Fig. 15)

**2.5** Position the ring gear on the differential carrier, aligning the bolt holes in the ring gear with those in the carrier. Using a plastic or

## 2. INSTALLING THE RING GEAR

copper hammer, tap evenly around the circumference of the ring gear until it is fully seated on the carrier. (Fig. 16)

### WARNING

Do not use the ring gear bolts to draw the ring gear onto the differential carrier. This may result in damage to the differential carrier or the threaded holes.

### INSTALLING THE RING GEAR

Threadlocker must be applied to the ring gear bolt threads during installation. Before applying threadlocker, it is recommended to pre-tighten the ring gear bolts to ensure that the ring gear seats fully against the differential carrier. This helps prevent threadlocker from spreading onto the mating surfaces. If the ring gear is not fully seated against the differential carrier, threadlocker may enter the mating surfaces and cause improper seating or misalignment of the ring gear. Follow the steps below to correctly install the ring gear.

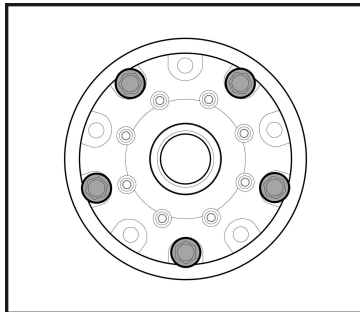


Fig. 17

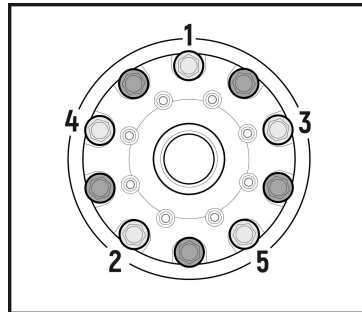


Fig. 18

**2.6** Install five ring gear bolts and pre-tighten them to draw the ring gear snugly against the differential carrier. Do not apply threadlocker at this stage, as these bolts will be removed later. (Fig. 17)

**2.7** Install the remaining ring gear bolts in the sequence shown in (Fig. 18). Before installing each bolt, apply threadlocker to the ring gear threaded hole and to the bolt threads (Fig. 19). Tighten the bolts using a torque wrench to the torque specification provided by the vehicle manufacturer.

**NOTE:** Tighten the ring gear bolts in a crisscross pattern to ensure the ring gear seats evenly against the carrier. Mark each tightened bolt to maintain the correct tightening sequence.

## 3. INSTALLING THE ELECTRIC LOCKER

### WARNING

During the following installation steps, ensure that the magnet cable is not damaged.

**3.11** Clean the carrier and ensure that it is free of dirt and debris. Then install the electric locker with the bearings into the carrier. Ensure that the inner and outer bearing races are installed in their original matched positions (step 1.15).

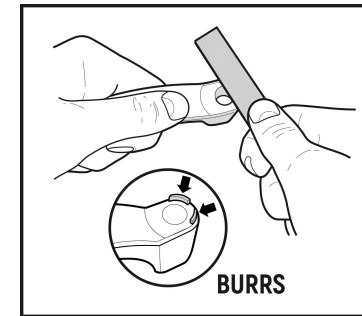


Fig. 24

**3.12** Inspect the contact surfaces on the right bearing cap where the bolt heads seat. Ensure that the surfaces are free of metal burrs. If burrs are present, remove them with a file to obtain a smooth, level surface (Fig. 24). This ensures that the bracket seats properly on the bearing cap during installation.

**3.13** Align the bearing caps with the sides of the axle housing using the identification marks made previously. Install the bearing caps. (step 1.7)

**3.14** Adjust the bearing preload in accordance with the vehicle repair manual. At this stage, accurately determine the required thickness of the shim pack.

**3.15** Tighten the bearing cap bolts to the torque specified by the vehicle manufacturer using a torque wrench.

### WARNING

When installing the electric locker, the differential bearing preload must be adjusted (do not skip step 3.15). Incorrect bearing preload may result in excessive bearing wear, increased load on the differential, noise, and potential damage to the ring and pinion gear set.

### 3. INSTALLING THE ELECTRIC LOCKER

future hole with a marker or center punch. Note that in the figure the hole (3) is located on the side of the magnet (1), near the point (2) where the cable exits the magnet (Fig. 23).

**NOTE:** If the differential carrier of your vehicle differs from the differential carrier shown in (Fig. 23), determine the location of the hole yourself. Perform a preliminary installation of the electric locker as described in steps 3.1 and 3.2. After that, mark the location of the future hole on the surface of the differential carrier, adhering to the following criteria:

- The hole must be located on the side with the magnet (1) (Fig. 23).
- The hole must be positioned near the point (2) where the cable exits the magnet (Fig. 23).
- The cable exiting the hole must not contact the ring and pinion gears or any moving components of the differential.
- Do not drill the hole in areas where the carrier wall is thickened.
- The hole must be located in a position on the outer surface of the differential carrier where the surface relief will not interfere with the installation and tightening of the cable rubber seal.
- If a suitable location cannot be found on the outer surface of the differential carrier that allows proper installation of the cable rubber seal, a small portion of the differential carrier surface relief may be carefully ground down using a rotary tool until the cable rubber seal fits properly.

**3.4** After determining and marking the location of the future hole, remove the electric locker and all other components installed during the preliminary assembly described in steps 3.1 and 3.2.

**3.5** Secure the differential carrier in a bench vise.

**3.6** Before drilling, cover the pinion gear area with a rag to prevent metal shavings from entering the carrier.

**3.7** Drill a hole with a diameter of 1/2 in.

**3.8** Deburr the edges of the hole to remove any sharp edges and prevent metal shavings from entering the carrier.

**3.9** Remove the rag from the pinion gear area and remove any metal shavings generated during drilling.

**3.10** Using a flashlight, inspect the carrier and the pinion gear to ensure that no metal shavings remain inside.

### 2. INSTALLING THE RING GEAR

#### WARNING

On some vehicles, the ring gear bolts are not intended for reuse. Refer to the vehicle service manual for additional information.

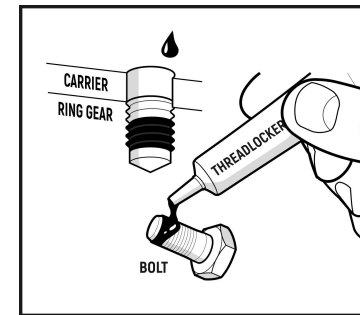


Fig. 19

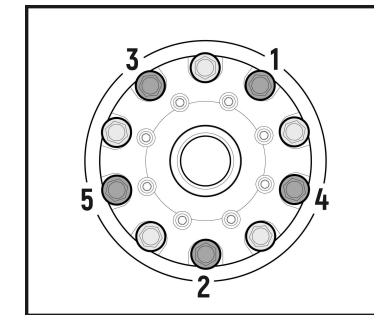


Fig. 20

**2.8** Remove the five pre-tightened bolts installed in step 2.6. Reinstall them one at a time in the sequence shown in (Fig. 20). Before installing each bolt, apply threadlocker to the ring gear threaded hole and to the bolt threads (Fig. 19). Tighten the bolts using a torque wrench to the torque specification provided by the vehicle manufacturer.

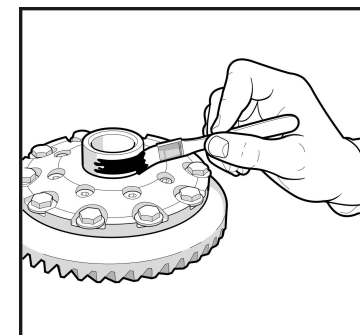


Fig. 21

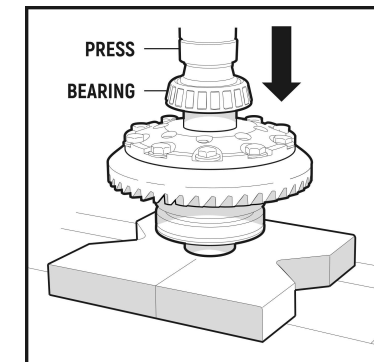


Fig. 22

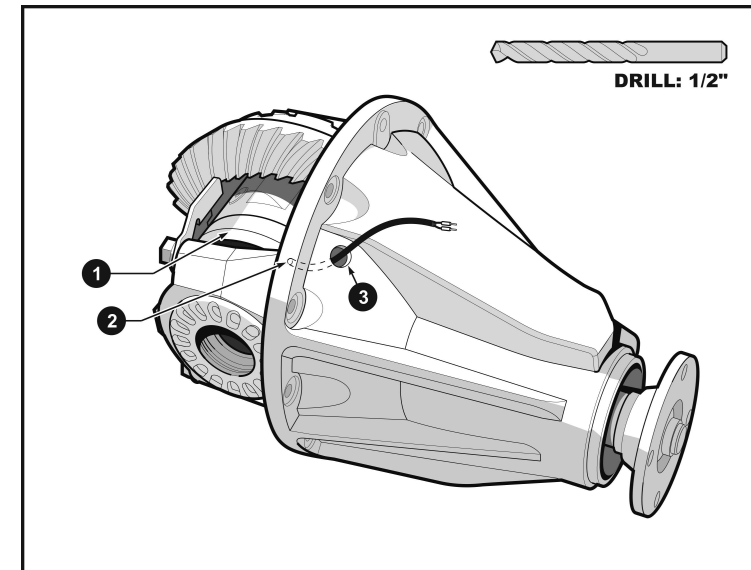
**2.9** Apply a thin film of high-pressure grease to both bearing journals of the electric locker to prevent seizing. (Fig. 21)

**2.10** Press the bearings onto the assembly and install the outer races in accordance with the previously applied markings. (Fig. 22)

### WARNING

Ensure that the bearings are in good condition. Replace any bearings that are damaged or worn.

### DETERMINING THE POSITION AND DRILLING THE HOLE



**Fig. 23 :** (1) - magnet; (2) - location of the cable exit from the magnet; (3) - hole in the carrier

To install the electric locker, it is necessary to drill a hole in the carrier. To determine where to drill the hole, the electric locker must first be temporarily installed in the carrier. Tightening the bolts and adjusting the bearings are not required at this stage, as the assembly is performed only to determine the position of the magnet (1) and the location of the cable exit from the magnet (2) relative to the carrier walls (Fig. 23). After correctly determining the hole location (3), the electric locker must be removed before drilling. Follow the steps below to identify and drill the hole:

- 3.1 Install the electric locker together with the ring gear and bearings into the differential carrier.
- 3.2 Unscrew the bolts (3) of the right bearing cap and install the bracket (2). Rotate the magnet so that the magnet limiter (1) enters the hole in the bracket (2). Reinstall and tighten the bolts (3) (Fig. 29). Once the magnet rotation is restricted by the magnet limiter, the cable will assume its defined position, and you can begin determining the location of the hole in the differential carrier.
- 3.3 Figure 23 shows the recommended location of the hole (3) in the differential carrier. Using the figure as a guide, mark the location of the